```
From:
                   Farhat, Jody S NWD02
Sent:
                   Friday, April 01, 2011 10:10 AM
                              D NWD02;
                                            NWD02; NWD02;
To:
                        NWD02
Subject:
                   RE: 2011 April Runoff Forecast (UNCLASSIFIED)
Classification: UNCLASSIFIED
Caveats: NONE
Gather around and call me on my cell asap. I've got to head to the office in a few minutes.
----Original Message----
From: NWD02
Sent: Friday, April 01, 2011 9:59 AM
To: Farhat, Jody S NWD02; NWD02; NWD02; NWD02;
NWD02
Subject: RE: 2011 April Runoff Forecast (UNCLASSIFIED)
Classification: UNCLASSIFIED
Caveats: NONE
Jody,
In the Comp-1Apr tab, Cell F6 contains the forecasted remaining runoff above Gavins Point.
Everything else is static according to Kevin.
> ----Original Message----
> From: Farhat, Jody S NWD02
> Sent: Friday, April 01, 2011 9:44 AM
> To: NWD02; MWD02; NWD02;
> A NWD02; 📹
               NWD02
> Subject: RE: 2011 April Runoff Forecast (UNCLASSIFIED)
> Classification: UNCLASSIFIED
> Caveats: NONE
> I'd like to have the estimate of Service level before we discuss the
> forecast. While I don't oppose what you've come up with as your
> runoff forecast, I do believe it's on the strong side considering what
> is actually out there in terms of plains snowpack (very little except
> north of the river in ND and the Milk basin) and the mountain snowpack
> is only slightly above normal and nothing to write home about.
> Jody
> ----Original Message-----
> From: NWD02
> Sent: Friday, April 01, 2011 9:08 AM
> To: Farhat, Jody S NWD02;
                                  NWD02;
> A NWD02; NWD02
> Subject: 2011 April Runoff Forecast (UNCLASSIFIED)
>
```

```
> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Jody,
> Attached is the preliminary runoff forecast that Kevin and I have
> developed under careful consideration of the mountain snowpack,
> existing plains snow, basin hydrologic conditions and the expected
> climate outlook.
> BLUF: The forecast rose from 29.7 MAF to 34.6 MAF, which is now an
> upper decile runoff forecast.
> Runoff volumes for March were quite high as a result of elevated
> runoff overall, but especially in the Garrison, Oahe, and in the Sioux
> City reaches. March 2011 runoff above Sioux City, IA, was 231% of
> normal at
> 6653 KAF, and above Gavins Point Dam runoff was 213% of normal at 5501
> KAF. Fort Peck received 1049 KAF (176%), Garrison received 1567 KAF
> (156%), Oahe received 1806 KAF (319%), Fort Randall received 686 KAF
> (328%), Gavins Point received 392 KAF (190%), and the Sioux City reach
> received 1152 KAF (385%).
> The overall calendar year 2011 runoff forecast is 29.5 MAF (130% of
> normal) above Gavins Point Dam, which is an increase of 3.95 MAF from
> the March 2011 forecast. This increase is due in part to actual March
> runoff being higher than forecasted March runoff, an increase in
> forecasted runoff into the Garrison reach, and an increase in the
> expected mountain snowmelt runoff due to increased mountain SWE. The
> summation above Sioux City is 34.6 MAF (139% of normal), an increase
> of
> 4.6 MAF.
> Remaining plains snow pack (2.5-4.5 inches of SWE) in the Fort Peck to
> Garrison reach north of the Missouri River has not melted, and as a
> result Garrison is expected to receive up to 2.0 MAF of runoff in the
> month of April, which represents about 1.0 inch of snowmelt runoff
> from the contributing area covered with snow (35,000 square miles).
> The total March-April runoff forecast into Garrison is 3.5 MAF.
> Similar runoff volumes occurred in March and April of calendar years
> 1949 (2.9 MAF), 1960 (2.8 MAF), 1969 (3.4 MAF), and 1979 (4.5 MAF),
> which were all impacted by moderate to heavy plains snow in the Garrison reach.
> Mountain snow accumulations as a percent of long-term averages are
> 116% of normal above Fort Peck and 112% of normal in the Fort Peck to
> Garrison reach. As a result, the May-July runoff above Fort Peck is
> expected to be 122% of normal, while the Fort Peck to Garrison reach
> is expected to receive 110% of normal runoff using snow to runoff
> regression equations. Runoff in all reaches above the System are
> forecasted to return to normal by August 2011, while above average
> runoff is forecasted in the Gavins to Sioux City reach due to
> persistently high streamflow conditions.
      and I are also examining the Service Level calculation and
> will revise it when we have agreed upon a final forecast.
> Please let us know when you are ready to discuss the forecast.
```

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

NWD02

Sent:

Friday, April 01, 2011 11:57 AM

To:

Farhat, Jody S NWD02

Cc:

NWD02; NWD02

Apr 1 Runoff Forecast and Service Level (UNCLASSIFIED)

Subject: Attachments:

Runoff_Forecast_Apr2011.pdf; ServiceLevelComp_2011Apr01.pdf

Classification: UNCLASSIFIED

Caveats: NONE

Jody,

Attached is the final April 1 runoff forecast and service level computation.

Reservoir Regulation Team Lead Missouri River Basin Water Management, Northwestern Division, USACE

(fax)

Classification: UNCLASSIFIED

Reach Above	Fort Peck	Garrison	Oahe	Fort Randal1	Gavins Point	Sioux City	Summation above Gavins Point	Summation above Sioux City	Accumulated Summation above Sioux City
				Values in 100	00 Acre Feet		Tour	City	Bloak City
	(History)								
JAN 2011	431	299	120	86	67	273	1,003	1,276	1,276
NORMAL	312 119	261 38	12 108	25 61	100 -33	40 233	710 293	750 526	750 536
DEPARTURE % OF NORM	138%	38 115%	998%	346%	-33 67%	233 682%	293 141%	526 170%	526 170%
78 OF NORM	13070	11370	99070	34070	0770	03270	14170	17076	17070
FEB 2011	580	457	318	217	236	524	1,808	2,333	3,609
NORMAL	360	356	90	49	130	92	985	1,077	1,827
DEPARTURE	220	101	228	168	106	432	823	1,256	1,782
% OF NORM	161%	128%	354%	443%	182%	570%	184%	217%	198%
MAR 2011	1,049	1.567	1,806	686	392	1,152	5,501	6,653	10,262
NORMAL	596	1,003	567	209	206	299	2,581	2,880	4,707
DEPARTURE	453	564	1,239	477	186	853	2,920	3,773	5,555
% OF NORM	176% (Forecast)	156%	319%	328%	190%	385%	213%	231%	218%
APR 2011	668	1,535	650	207	250	1,279	3,310	4,589	14,851
NORMAL	649	1,080	481	144	180	360	2,534	2,894	7,601
DEPARTURE	19	455	169	63	70	919	776	1,695	7,250
% OF NORM	103%	142%	135%	144%	139%	355%	131%	159%	195%
MAY 2011	1,236	1,355	400	147	186	700	3,324	4,024	18,875
NORMAL	1,081	1,245	312	147	186	292	2,971	3,263	10,864
DEPARTURE	155	110	88	0	0	408	353	761	8,011
% OF NORM	114%	109%	128%	100%	100%	240%	112%	123%	174%
JUN 2011	1,851	2,916	460	152	178	350	5,557	5,907	24,782
NORMAL	1,612	2,667	423	152	178	286	5,032	5,318	16,182
DEPARTURE	239	249	37	0	0	64	525	589	8,600
% OF NORM	115%	109%	109%	100%	100%	122%	110%	111%	153%
JUL 2011	938	1,946	185	57	137	250	3,263	3,513	28,295
NORMAL	819	1,776	179	57	137	218	2,968	3,186	19,368
DEPARTURE	119	170	6	0	0	32	295	327	8,927
% OF NORM	115%	110%	103%	100%	100%	115%	110%	110%	146%
AUG 2011	353	604	65	39	115	150	1,176	1,326	29,621
NORMAL	353	604	65	39	115	131	1,176	1,307	20,675
DEPARTURE	0	0	0	0	0	19	0	19	8,946
% OF NORM	100%	100%	100%	100%	100%	115%	100%	101%	143%
SEP 2011	333	452	111	38	111	110	1,045	1,155	30,776
NORMAL	333	452	111	38	111	99	1,045	1,144	21,819
DEPARTURE	0	0	0	0	0	11	0	11	8,957
% OF NORM	100%	100%	100%	100%	100%	111%	100%	101%	141%
OCT 2011	385	523	66	5	120	86	1,099	1,185	31,961
NORMAL	385	523	66	5	120	78	1,099	1,177	22,996
DEPARTURE	0	0	0	0	0	8	0	8	8,965
% OF NORM	100%	100%	100%	100%	100%	110%	100%	101%	139%
NOV 2011	384	398	67	6	118	83	973	1,056	33,017
NORMAL	384	398	67	6	118	76	973	1,049	24,045
DEPARTURE	0	0	0	0	0	7	. 0	7	8,972
% OF NORM	100%	100%	100%	100%	100%	109%	100%	101%	137%
DEC 2011	329	247	0	12	100	56	688	744	33,762
NORMAL	329	247	0	12	100	52	688	740	24,785
DEPARTURE	0	0	0	0	0	4	0	4	8,976
% OF NORM	100%	100%	100%	100%	100%	108%	100%	101%	136%
				Calendar Y					
Monarca	8,537	12,300	4,249	1,653	2,010	5,013	28,749	33,762	
NORMAL DEPARTURE	7,213	10,612	2,373	883	1,681	2,023	22,762	24,785	
% OF NORM	1,324 118%	1,688 116%	1,876 179%	770 187%	329 120%	. 2,990 248%	5,987 126%	8,976 136%	
A OI HOIGH	110/0	110/0	1//0	10770	120/0	470/0	120/0	120/0	

Service Level Determination 1-Apr-2011

Mainstem System Storage Forecasted Remaining Runoff Above Gavins thru end of year Tributary Storage Deficiency/Excess	61.7 MAF 20.4 MAF -0.9 MAF	$04/01/2011$ - from database or bulletin Total Forecasted ab Gavins min Jan Feb Mar actuals (28.749 - 1.003 - 1.808 - 5.501) Determine trib deficiency/excess $\sim 5.5~\mathrm{MAF}$
Total Water Supply	81.3 MAF	This is the value that is used on Plate VI-1 - based on this number,
Water Supply from Plate VI-1 - 40 Water Supply from Plate VI-1 - 50	78.9 MAF 83.7 MAF	adjust rows in any 12 (rower and upper limits) Find lower limit for Apr 1 Find upper limit for Apr 1
Service Level (from Plate VI-1)	45,000 cfs	
Increase over full service level	10,000 cfs	
Revised Targets Sioux City	41,000 cfs	
Omaha	41,000 cfs	
Nebraska City	47,000 cfs	
Kansas City	51,000 cfs	

*Service level revised based on a check of Plate VI-1. The Plate indicated a level near expanded full service. The check indicated the plate did not properly take into account the Jan/Feb runoff of the following year. Winter releases were higher than 20,000 cfs for some evacuation scenarios. The base of the annual flood control zone was now 56.8 MAF instead of 57.1 MAF.

From: Sent:

NWD02 Friday, April 01, 2011 9:59 AM

To:

Farhat, Jody S NWD02; ■

Subject: Attachments:

RE: 2011 April Runoff Forecast (UNCLASSIFIED)

NWD02;

NWD02;

MM-PlateVI-1-2011-computation.xlsx

Classification: UNCLASSIFIED

Caveats: NONE

Jody,

In the Comp-1Apr tab, Cell F6 contains the forecasted remaining runoff above Gavins Point. Everything else is static according to Kevin.

```
> ----Original Message----
> From: Farhat, Jody S NWD02
> Sent: Friday, April 01, 2011 9:44 AM
               NWD02;
                                           NWD02;
> To:
                   NWD02
> A NWD02;
> Subject: RE: 2011 April Runoff Forecast (UNCLASSIFIED)
> Classification: UNCLASSIFIED
> Caveats: NONE
> I'd like to have the estimate of Service level before we discuss the
> forecast. While I don't oppose what you've come up with as your
> runoff forecast, I do believe it's on the strong side considering what
> is actually out there in terms of plains snowpack (very little except
> north of the river in ND and the Milk basin) and the mountain snowpack
> is only slightly above normal and nothing to write home about.
>
> Jody
> ----Original Message----
> From: ¶
                    NWD02
> Sent: Friday, April 01, 2011 9:08 AM
> To: Farhat, Jody S NWD02; N
> A NWD02;
                    NWD02
> Subject: 2011 April Runoff Forecast (UNCLASSIFIED)
> Classification: UNCLASSIFIED
> Caveats: NONE
> Jody,
> Attached is the preliminary runoff forecast that Kevin and I have
> developed under careful consideration of the mountain snowpack,
> existing plains snow, basin hydrologic conditions and the expected
> climate outlook.
> BLUF: The forecast rose from 29.7 MAF to 34.6 MAF, which is now an
```

```
> upper decile runoff forecast.
> Runoff volumes for March were quite high as a result of elevated
> runoff overall, but especially in the Garrison, Oahe, and in the Sioux
> City reaches. March 2011 runoff above Sioux City, IA, was 231% of
> normal at
> 6653 KAF, and above Gavins Point Dam runoff was 213% of normal at 5501
> KAF. Fort Peck received 1049 KAF (176%), Garrison received 1567 KAF
> (156%), Oahe received 1806 KAF (319%), Fort Randall received 686 KAF
> (328%), Gavins Point received 392 KAF (190%), and the Sioux City reach
> received 1152 KAF (385%).
> The overall calendar year 2011 runoff forecast is 29.5 MAF (130% of
> normal) above Gavins Point Dam, which is an increase of 3.95 MAF from
> the March 2011 forecast. This increase is due in part to actual March
> runoff being higher than forecasted March runoff, an increase in
> forecasted runoff into the Garrison reach, and an increase in the
> expected mountain snowmelt runoff due to increased mountain SWE. The
> summation above Sioux City is 34.6 MAF (139% of normal), an increase
> of
> 4.6 MAF.
> Remaining plains snow pack (2.5-4.5 inches of SWE) in the Fort Peck to
> Garrison reach north of the Missouri River has not melted, and as a
> result Garrison is expected to receive up to 2.0 MAF of runoff in the
> month of April, which represents about 1.0 inch of snowmelt runoff
> from the contributing area covered with snow (35,000 square miles).
> The total March-April runoff forecast into Garrison is 3.5 MAF.
> Similar runoff volumes occurred in March and April of calendar years
> 1949 (2.9 MAF), 1960 (2.8 MAF), 1969 (3.4 MAF), and 1979 (4.5 MAF),
> which were all impacted by moderate to heavy plains snow in the Garrison reach.
> Mountain snow accumulations as a percent of long-term averages are
> 116% of normal above Fort Peck and 112% of normal in the Fort Peck to
> Garrison reach. As a result, the May-July runoff above Fort Peck is
> expected to be 122% of normal, while the Fort Peck to Garrison reach
> is expected to receive 110% of normal runoff using snow to runoff
> regression equations. Runoff in all reaches above the System are
> forecasted to return to normal by August 2011, while above average
> runoff is forecasted in the Gavins to Sioux City reach due to
> persistently high streamflow conditions.
> Kevin, Mike and I are also examining the Service Level calculation and
> will revise it when we have agreed upon a final forecast.
> Please let us know when you are ready to discuss the forecast.
> Thanks.
>
> USACE, Northwestern Division
 Missouri Basin Water Management Division
      @usace.army.mil
```

Service Level Determination 1-Apr-2011

Mainstem System Storage Forecasted Remaining Runoff Above Gav Tributary Storage Deficiency/Excess	ins thru end of year	61.7 MAF 21.2 MAF -0.9 MAF	04/01/2011 - from data Total Forecasted ab G Determine trib deficien
Total Water Supply		82.1 MAF	This is the value that is
Water Supply from Plate VI-1 - Water Supply from Plate VI-1 -	40 50	78.9 MAF 83.7 MAF	Find lower limit for Apr Find upper limit for Apr
Service Level (from Plate VI-1)		47,000 cfs	
Increase over full service level		12,000 cfs	
Revised Targets			
Sioux City		43,000 cfs	
Omaha		43,000 cfs	
Nebraska City		49,000 cfs	
Kansas City		53,000 cfs	

^{*}Service level revised based on a check of Plate VI-1. The Plate indicated a level near expanded full service. The check indicated the plate did not properly take into account the Jan/Feb runoff of the following year. Winter releases were higher than 20,000 cfs for some evacuation scenarios. The base of the annual flood control zone was now 56.8 MAF instead of 57.1 MAF.

base or bulletin avins min Jan Feb Mar actuals (29.5 - 1.0 - 1.8 - 5.5) cy/excess ~ 5.5 MAF

used on Plate VI-1 - based on this number, adjust rows 11 and 12 (lower and upper limits)

1

• 1

2009	Svc = 40 Svc = 50		svc = 45			
64900 9202 647 74749 1147 75896	72519 75996	74749 0.6	74258	1.0	439	
Storage Runoff trib excess Total trib ex??	1-Jul 1-Jul		compute		trib excess	trib excess
		·	6147		5939	5310 4645 4632
Red Rock Amadison am-Missouri Fork Sun m-Marias Bull Lake am-Wind hoshone n-Bighorn Lake YETL Stor Stor </td <td>1124987 1130504 1137226</td> <td>1137082 1140688</td> <td>1143728</td> <td></td> <td>1057100 1057100 1054288</td> <td>962612 960869 825.277 835,859</td>	1124987 1130504 1137226	1137082 1140688	1143728		1057100 1057100 1054288	962612 960869 825.277 835,859
BUBI boshone h-E Stor ac-ft ST-VAL 543985 555999 559110 563368 567103 571092	57.5626 57.8626 585.403	589363 589363 593785	330 (80 603 (39	612410 611475	610152 608580 606936	487193 485526 438,145 433,323
CAFE GDMT TIBR BULA BOYN BUBI Missouri Fork Sun n-Marias Bull Lake am-Wind hoshone Stor Stor <t< td=""><td>690519 698831</td><td>71 1478</td><td>720458</td><td>699956 699014</td><td>696956 696956 694902</td><td>639569 639219 597 850 595,410</td></t<>	690519 698831	71 1478	720458	699956 699014	696956 696956 694902	639569 639219 597 850 595,410
BULA Bull Lake 8 Stor usbr-rev ac-ft 129157 131062 132173 133163 133163 134367 134367	135245 136001 136818	37.152 37.152 37.365	5 68 2 52 2 53	148439 147908	147440 146971 146634	66454 65846 71250 70,915
TIBR Stor usbr-rev ac-ft NST-VAL 812709 822760 8338024 842602 848044			96.29 60.29 60.29	874599 874258	873049 873049 872532	842602 842438 769 201 793,010
GDMT Stor Stor usbr-rev ac-ft VST-VAL 96542 95765 95596 95596 95548 96503				48411 46287	44218 42108 40054	15926 16.240 16.041 16,146
CAFE GDMT TIBR BULA BOYN BUBI -Missouri Fork Sun n-Marias Bull Lake am-Wind :hoshone Stor Stor Stor Stor Stor Stor usbr-rev usbr-rev usbr-rev usbr-rev ac-ft ac	1959723 19634457 1963410	967.168	1966490	1870267 1887941	1861978 1864622 1857998	1788094 1766465 1,418,824 1,391,407
HEBN Madison an Stor usbr-rev ac-ft 1ST-VAL 380332 380332 380332 380332 380332	38088 380205 382800		385007	377217 376563	375523 375396 374492	343798 343556 298 361 284,182
ed Rock ?ed Rock -Madison Stor Stor Stor stor Stor Stor stor ac-ft ac-ft ac-ft IST-VAL vST-VAL vST-VAL 75839 178558 381112 75901 181214 380332 76261 182941 380332 76079 18535 380465 77700 186201 380332			88897	173902 172773	171541 170724 169707	143912 142912 60, 106 161,607
lima CLCA HEBN Red Rock Madisor Stor Stor Stor Stor Stor Stor Stor St		77.77 44.77 12.27 10.20 10.00	24 E	96451 66002	65850 95850 85150	469£1 46920 49,661 50,607
GMT-06:00 17Jun2010 18Jun2010 19Jun2010 20Jun2010 21Jun2010 22Jun2010 23Jun2010	24.Jun2010 25.Jun2010 26.Jun2010	28-Jun-10 29-Jun-10	1-Jul-10	28-Jul-10 29-Jul-10	30-Jul-10 31-Jul-10 1-Aug-10	29-Sep-10 30-Sep-10 28-Feb-11 31-Mar-11
U Type Tan C B A A C B A	∞ o O ;			en e		

	40	50	60	70
1-Jan	82439	87891	93553	98553
2-Jan				
3-Jan				
4-Jan				
5-Jan				
6-Jan				
7-Jan				
8-Jan				
9-Jan				
10-Jan				
11-Jan				
12-Jan				
13-Jan				
14-Jan				
15-Jan				
16-Jan				
17-Jan				
18-Jan				
19-Jan				
20-Jan				
21-Jan				
22-Jan				
23-Jan				
24-Jan				
25-Jan 26-Jan				
20-Jan 27-Jan				
28-Jan				
29-Jan				
30-Jan				
31-Jan	81394	86661	92120	97120
1-Feb				
2-Feb				
3-Feb				
4-Feb				
5-Feb				
6-Feb				
7-Feb				
8-Feb				
9-Feb				
10-Feb				
11-Feb 12-Feb				
12-Feb 13-Feb				
13-1 eb 14-Feb				
15-Feb				
16-Feb				
17-Feb				
18-Feb				
19-Feb				
20-Feb				
21-Feb				
22-Feb				
23-Feb				

24-Feb				
25-Feb				
26-Feb				
27-Feb				
28-Feb	80450	85550	90950	95950
1-Mar	80416	85510	90902	95902
2-Mar	80383	85471	90855	95855
3-Mar	80349	85431	90807	95807
4-Mar	80315	85391	90760	95760
5-Mar	80281	85352	90712	95712
6-Mar	80248	85312	90664	95664
7-Mar	80214	85272	90617	95617
8-Mar	80180	85233	90569	95569
9-Mar	80147	85193	90522	95522
10-Mar	80113	85153	90474	95474
11-Mar	80079	85114	90426	95426
12-Mar	80045	85074	90379	95379
13-Mar	80012	85034	90331	95331
14-Mar	79978	84995	90284	95284
15-Mar	79944	84955	90236	95236
16-Mar	79905	84909	90182	95182
17-Mar	79859	84858	90123	95123
18-Mar	79807	84800	90057	95057
19-Mar	79750	84737	89986	94986
20-Mar	79687	84667	89909	94909
21-Mar	79624	84592	89825	94825
22-Mar	79561	84511	89736	94736
23-Mar	79498	84428	89641	94641
24-Mar	79435	84345	89540	94540
25-Mar	79373	84263	89437	94433
26-Mar	79310	84180	89335	94320
27-Mar	79247	84097	89232	94201
28-Mar	79184	84014	89130	94078
29-Mar	79121	83932	89027	93956
30-Mar	79058	83849	88924	93833
31-Mar	78995	83766	88822	93711
1-Apr	78932	83684	88719	93589
2-Apr	78870	83601	88617	93466
3-Apr	78807	83518	88514	93344
4-Apr	78744	83435	88412	93221
5-Apr	78681	83353	88309	93099
6-Apr	78618	83270	88207	92977
7-Apr	78555	83187	88104	92854
8-Apr	78492	83105	88002	92732
9-Apr	78429	83022	87899	92610
10-Apr	78367	82939	87796	92487
11-Apr	78304	82856	87694	92365
12-Apr	78241	82774	87591	92242
13-Apr	78178 78115	82691	87489 87386	92120
14-Apr	78115 78052	82608	87386	91998
15-Apr	78052	82526	87284 97191	91875
16-Apr	77989 77026	82443	87181 87070	91753
17-Apr	77926 77964	82360 82377	87079 86076	91631
18-Apr	77864 77801	82277	86976 86974	91508
19-Apr	77801	82195	86874	91386

20 125	77720	00110	06774	04262
20-Apr	77738	82112	86771	91263
21-Apr	77675	82029	86668	91141
22-Apr	77612	81947	86566	91019
23-Apr	77549	81864	86463	90896
24-Apr	77486	81781	86361	90774
25-Apr	77423	81698	86258	90651
26-Apr	77361	81616	86156	90529
27-Apr	77298	81533	86053	90407
28-Apr	77235	81450	85951	90284
29-Apr	77172	81368	85848	90162
30-Apr	77109	81285	85745	90040
1-May	77044	81200	85640	89915
2-May	76978	81114	85535	89790
3-May	76913	81029	85430	89665
4-May	76847	80944	85325	89540
5-May	76782	80858	85220	89415
6-May	76716	80773	85115	89290
7-May	76651	80688	85010	89165
8-May	76585	80603	84904	89040
9-May	76520	80517	84799	88915
10-May	76454	80432	84694	88790
11-May	76383	80347	84589	88665
12-May	76307	80261	84484	88540
13-May	76231	80176	84379	88415
14-May	76156	80091	84274	88290
15-May	76080	80006	84169	88165
16-May	76004	79920	84063	88040
17-May	75928	79835	83958	87915
18-May	75853	79750	83853	87790
19-May	75777	79664	83748	87665
20-May	75701	79579	83643	87540
21-May	75625	79494	83538	87415
22-May	75550	79408	83433	87290
23-May	75474	79323	83328	87165
24-May	75398	79238	83222	87041
25-May	75322	79153	83117	86916
26-May	75246	79067	83012	86791
27-May	75171	78982	82907	86666
28-May	75095	78897	82802	86541
29-May	75019	78811	82697	86416
30-May	74943	78726	82592	86291
31-May	74868	78641	82487	86166
1-Jun	74792	78556	82382	86041
2-Jun	74716	78471	82277	85916
3-Jun	74640	78386	82172	85792
4-Jun	74565	78301	82067	85667
5-Jun	74489	78215	81962	85542
6-Jun	74413	78130	81857	85417
7-Jun	74337	78045	81752	85292
8-Jun	74261	77960	81647	85168
9-Jun	74186	77875	81542	85043
10-Jun	74110	77790	81437	84918
11-Jun	74034	77705	81332	84793
12-Jun	73958	77620	81227	84669
13-Jun	73883	77535	81123	84544

14-Jun	73807	77450	81018	84419
15-Jun	73731	77364	80913	84294
	73655	77279	80808	84170
16-Jun				
17-Jun	73580	77194	80703	84045
18-Jun	73504	77109	80598	83920
19-Jun	73428	77024	80493	83795
20-Jun	73352	76939	80388	83671
21-Jun	73276	76854	80283	83546
22-Jun	73201	76769	80178	83421
23-Jun	73125	76684	80073	83296
24-Jun	73049	76599	79968	83171
25-Jun	72973	76514	79863	83047
26-Jun	72898	76428	79758	82922
27-Jun	72822	76343	79654	82797
28-Jun	72746	76258	79549	82672
29-Jun	72670	76173	79444	82548
30-Jun	72595	76088	79339	82423
1-Jul	72519	75996	79227	82291
2-Jul	72443	75903	79114	82159
3-Jul	72367	75811	79002	82027
4-Jul	72291	75718	78890	81895
5-Jul	72216	75626	78777	81762
6-Jul	72140	75534	78665	81630
7-Jul	72064	75441	78553	81498
8-Jul	71988	75349	78441	81366
9-Jul	71913	75256	78328	81234
10-Jul	71837	75164	78216	81102
11-Jul	71761	75071	78104	80970
12-Jul	71685	74979	77992	80838
12-3ul 13-Jul	71610	74887	77879	80706
14-Jul	71534	74794	77767	80574
14-3ul 15-Jul	71458	74702	77655	80441
16-Jul	71382	74609	77543	80309
17-Jul	71306	74517	77430	80177
18-Jul	71231	74424	77318	80045
19-Jul	71155	74332	77206	79913
20-Jul	71079	74239	77093	79781
21-Jul	71003	74147	76981	79649
22-Jul	70928	74055	76869	79517
23-Jul	70852	73962	76757	79385
24-Jul	70776	73870	76644	79253
25-Jul	70700	73777	76532	79120
26-Jul	70625	73685	76420	78988
27-Jul	70549	73592	76308	78856
28-Jul	70473	73500	76195	78724
29-Jul	70397	73408	76083	78592
30-Jul	70321	73315	75971	78460
31-Jul	70246	73223	75859	78328
1-Aug	70170	73127	75743	78193
2-Aug	70094	73032	75628	78057
3-Aug	70034	73032	75512	77922
4-Aug	69943	72930 72840	75312 75397	77787
_	69867	72745	75281	77651
5-Aug	69791	72745 72649	75261 75166	77516
6-Aug		72549 72554		
7-Aug	69715	12004	75050	77381

8-Aug 9-Aug 10-Aug 11-Aug 12-Aug 12-Aug 15-Aug 15-Aug 16-Aug 17-Aug 21-Aug 22-Aug 22-Aug 22-Aug 23-Aug 25-Aug 25-Aug 26-Aug 27-Aug 28-Aug 27-Aug 28-Aug 29-Aug 31-Aug 31-Aug 1-Sep 3-Sep 4-Sep 5-Sep 10-Sep 11-Sep 1	69640 69564 69488 69412 69336 69261 69185 69109 69033 68958 68882 68806 68730 68655 68579 68503 68427 68351 68276 68200 68124 68048 67973 67822 67748 67673 67599 67524 67449 67375 67300 67226 67151 67076 67002 66927 66853 66778 66629 66554 66405 66405 66331 66256 66181	72458 72362 72267 72171 72075 71980 71884 71789 71693 71597 71502 71406 71311 71215 71119 71024 70928 70833 70737 70641 70546 70450 70355 70259 70165 70070 69976 69881 69787 69693 69598 69504 69409 69315 69693 69598 69504 69409 69315 69693 69504 69409 69315 69693 69504 69409 69315 69693 69504 69409 69315 69693 69504 69409 69315 69693 69504 69409 69315 69693 69504 69409 69315 69693 69504 69409 69315 69504 69409 69315 69504 69693 69504 69409 69315 69504 69693 68748 68654 68748 68654 68771 68276 68887	74935 74820 74704 74589 74473 74358 74242 74127 74012 73896 73781 73665 73550 73434 73319 73203 73088 72973 72857 72742 72626 72511 72395 72280 72166 72051 71937 71823 71709 71594 71480 71366 71252 71137 71023 70909 70795 70680 70566 70452 70338 70223 70109 69995 69881 69766 69652	77246 77110 76975 76840 76704 76569 76434 76299 76163 76028 75893 75758 75622 75487 75352 75216 75081 74946 74811 74675 74540 74405 74405 74270 74134 74000 73866 73732 73598 73464 73330 73196 73062 72928 72793 72659 72525 72391 72257 72123 71989 71855 71721 71587 71453 71319 71184 71050
19-Sep 20-Sep 21-Sep	66480 66405 66331	68465 68371 68276	70109 69995 69881	71587 71453 71319
22-Sep				
1-Oct	65586	67333	68739	69979

2-Oct	65513	67240	68626	69846
3-Oct	65439	67147	68513	69713
4-Oct	65366	67054	68400	69580
5-Oct	65292	66960	68287	69447
6-Oct	65219	66867	68174	69314
7-Oct	65146	66774	68061	69181
8-Oct	65072	66681	67948	69049
9-Oct	64999	66588	67835	68916
10-Oct	64926	66494	67722	68783
		66401		68650
11-Oct	64852		67609	
12-Oct	64779	66308	67496	68517
13-Oct	64705	66215	67383	68384
14-Oct	64632	66121	67270	68251
15-Oct	64559	66028	67157	68118
16-Oct	64485	65935	67043	67985
17-Oct	64412	65842	66930	67853
18-Oct	64338	65749	66817	67720
19-Oct	64265	65655	66704	67587
20-Oct	64192	65562	66591	67454
21-Oct	64118	65469	66478	67321
22-Oct	64045	65376	66365	67188
23-Oct	63971	65282	66252	67055
24-Oct	63898	65189	66139	66922
25-Oct	63825	65096	66026	66789
26-Oct	63751	65003	65913	66656
27-Oct	63678	64910	65800	66524
28-Oct	63605	64816	65687	66391
29-Oct	63531	64723	65574	66258
30-Oct	63458	64630	65461	66125
31-Oct	63384	64537	65348	65992
1-Nov	63313	64445	65236	65861
2-Nov	63241	64354	65125	65730
3-Nov	63170	64262	65014	65599
4-Nov	63098	64171	64902	65468
5-Nov	63026	64079	64791	65336
6-Nov	62955	63988	64680	65205
7-Nov	62883	63897	64569	65074
8-Nov	62812	63805	64457	64943
9-Nov	62740	63714	64346	64812
10-Nov	62668	63622	64235	64681
11-Nov	62597	63531	64124	64550
12-Nov	62525	63439	64012	64419
13-Nov	62454	63348	63901	64288
14-Nov	62382	63256	63790	64156
15-Nov	62310	63165	63678	64025
16-Nov	62239	63074	63567	63894
17-Nov	62167	62982	63456	63763
18-Nov	62095	62891	63345	63632
19-Nov	62024	62799	63233	63501
20-Nov	61952	62708	63122	63370
21-Nov	61881	62616	63011	63239
22-Nov	61809	62525	62900	63108
23-Nov	61737	62433	62788	62976
24-Nov	61666	62342	62677	62845
25-Nov	61594	62251	62566	62714
20-11UV	01004	02231	02300	021 14

26-Nov	61523	62159	62454	62583
27-Nov	61451	62068	62343	62452
28-Nov	61379	61976	62232	62321
29-Nov	61308	61885	62121	62190
30-Nov	61236	61793	62009	62059
1-Dec	61165	61702	61898	61934
2-Dec	61093	61611	61787	61814
3-Dec	61021	61519	61676	61701
4-Dec	60956	61434	61570	61594
		61354	61471	61492
5-Dec	60896			
6-Dec	60842	61280	61377	61397
7-Dec	60795	61213	61290	61308
8-Dec	60751	61151	61208	61224
9-Dec	60708	61095	61133	61147
10-Dec	60664	61046	61063	61075
11-Dec	60621	60998	61000	61007
12-Dec	60577	60950	60942	60946
13-Dec	60534	60903	60890	60890
14-Dec	60490	60855	60842	60837
15-Dec	60447	60808	60795	60789
16-Dec	60404	60760	60747	60742
17-Dec	60360	60712	60700	60694
18-Dec	60317	60665	60652	60646
19-Dec	60273	60617	60604	60599
		60570		60551
20-Dec	60230		60557	
21-Dec	60186	60522	60509	60504
22-Dec	60143	60474	60462	60456
23-Dec	60099	60427	60414	60408
24-Dec	60056	60379	60366	60361
25-Dec	60013	60332	60319	60313
26-Dec	59969	60284	60271	60266
27-Dec	59926	60236	60224	60218
28-Dec	59882	60189	60176	60170
29-Dec	59839	60141	60128	60123
30-Dec	59795	60094	60081	60075
31-Dec	59752	60046	60033	60028
1-Jan	59709	59998	59986	59980
2-Jan	59665	59951	59938	59932
3-Jan	59622	59903	59890	59885
4-Jan	59578	59856	59843	59837
5-Jan	59535	59808	59795	59790
6-Jan	59491	59760	59748	59742
7-Jan	59448	59713	59700	59694
8-Jan	59404	59665	59652	59647
9-Jan	59361	59618	59605	59599
10-Jan	59318	59570	59557	59552
11-Jan	59274	59522	59510	59504
12-Jan	59231	59475	59462	59456
13-Jan	59187	59427	59414	59409
14-Jan	59144	59380	59367	59361
15-Jan	59100	59332	59319	59314
16-Jan	59057	59284	59272	59266
17-Jan	59014	59237	59224	59218
18-Jan	58970	59189	59176	59171
19-Jan	58927	59141	59129	59123

20-Jan	58883	59094	59081	59076
21-Jan	58840	59046	59034	59028
22-Jan	58796	58999	58986	58980
23-Jan	58753	58951	58938	58933
24-Jan	58709	58903	58891	58885
25-Jan	58666	58856	58843	58838
26-Jan	58623	58808	58795	58790
27-Jan	58579	58761	58748	58742
28-Jan	58536	58713	58700	58695
29-Jan	58492	58665	58653	58647
30-Jan	58449	58618	58605	58600
31-Jan	58405	58570	58557	58552
1-Feb	58358	58519	58506	58501
2-Feb	58311	58468	58455	58449
3-Feb	58264	58416	58404	58398
4-Feb	58217	58365	58352	58347
5-Feb	58170	58314	58301	58295
6-Feb	58122	58262	58250	58244
7-Feb	58075	58211	58198	58193
8-Feb	58028	58160	58147	58141
9-Feb	57981	58108	58096	58090
10-Feb	57934	58057	58044	58039
11-Feb	57887	58006	57993	57987
12-Feb	57840	57954	57942	57936
13-Feb	57792	57903	57890	57885
14-Feb	57745	57852	57839	57833
15-Feb	57698	57800	57788	57782
16-Feb	57651	57749	57736	57731
17-Feb	57604	57698	57685	57679
18-Feb	57557	57646	57634	57628
19-Feb	57509	57595	57582	57577
20-Feb	57462	57544	57531	57526
21-Feb	57415	57493	57480	57474
22-Feb	57368	57441	57428	57423
23-Feb	57321	57390	57377	57372
24-Feb	57274	57339	57326	57320
25-Feb	57227	57287	57274	57269
26-Feb	57179	57236	57223	57218
27-Feb	57132	57185	57172	57166
28-Feb	57085	57133	57121	57115
_0.00	5.500	5, 100	V, 12 1	5, 110



NWD02

Sent:

Friday, April 01, 2011 9:08 AM

To:

Farhat, Jody S NWD02;

NWD02

Subject: Attachments: 2011 April Runoff Forecast (UNCLASSIFIED)

Runoff_Forecast_Apr2011.pdf; 2011AprForecast.docx

Classification: UNCLASSIFIED

Caveats: NONE

Jody,

Attached is the preliminary runoff forecast that Kevin and I have developed under careful consideration of the mountain snowpack, existing plains snow, basin hydrologic conditions and the expected climate outlook.

NWD02;

NWD02;

BLUF: The forecast rose from 29.7 MAF to 34.6 MAF, which is now an upper decile runoff forecast.

Runoff volumes for March were quite high as a result of elevated runoff overall, but especially in the Garrison, Oahe, and in the Sioux City reaches. March 2011 runoff above Sioux City, IA, was 231% of normal at 6653 KAF, and above Gavins Point Dam runoff was 213% of normal at 5501 KAF. Fort Peck received 1049 KAF (176%), Garrison received 1567 KAF (156%), Oahe received 1806 KAF (319%), Fort Randall received 686 KAF (328%), Gavins Point received 392 KAF (190%), and the Sioux City reach received 1152 KAF (385%).

The overall calendar year 2011 runoff forecast is 29.5 MAF (130% of normal) above Gavins Point Dam, which is an increase of 3.95 MAF from the March 2011 forecast. This increase is due in part to actual March runoff being higher than forecasted March runoff, an increase in forecasted runoff into the Garrison reach, and an increase in the expected mountain snowmelt runoff due to increased mountain SWE. The summation above Sioux City is 34.6 MAF (139% of normal), an increase of 4.6 MAF.

Remaining plains snow pack (2.5-4.5 inches of SWE) in the Fort Peck to Garrison reach north of the Missouri River has not melted, and as a result Garrison is expected to receive up to 2.0 MAF of runoff in the month of April, which represents about 1.0 inch of snowmelt runoff from the contributing area covered with snow (35,000 square miles). The total March-April runoff forecast into Garrison is 3.5 MAF. Similar runoff volumes occurred in March and April of calendar years 1949 (2.9 MAF), 1960 (2.8 MAF), 1969 (3.4 MAF), and 1979 (4.5 MAF), which were all impacted by moderate to heavy plains snow in the Garrison reach.

Mountain snow accumulations as a percent of long-term averages are 116% of normal above Fort Peck and 112% of normal in the Fort Peck to Garrison reach. As a result, the May-July runoff above Fort Peck is expected to be 122% of normal, while the Fort Peck to Garrison reach is expected to receive 110% of normal runoff using snow to runoff regression equations. Runoff in all reaches above the System are forecasted to return to normal by August 2011, while above average runoff is forecasted in the Gavins to Sioux City reach due to persistently high streamflow conditions.

Kevin, Mike and I are also examining the Service Level calculation and will revise it when we have agreed upon a final forecast.

Please let us know when you are ready to discuss the forecast.

Thanks.

USACE, Northwestern Division Missouri Basin Water Management Division

Dusace.army.mil

Classification: UNCLASSIFIED

Reach Above	Fort Peck	Garrison	Oahe	Fort Randall	Gavins Point	Sioux City	Summation above Gavins Point	Summation above Sioux City	Accumulated Summation above
				Values in 10	00 Acre Feet		Polit	City	Sioux City
	(History)								
JAN 2011	431	299	120	86	67	273	1,003	1,276	1,276
NORMAL	312	261	12	25	100	40	710	750	750
DEPARTURE	119	38	108	61	-33	233	293	526	526
% OF NORM	138%	115%	998%	346%	67%	682%	141%	170%	170%
FEB 2011	580	457	318	217	236	524	1,808	2,333	3,609
NORMAL	360	356	90	49	130	92	985	1,077	1,827
DEPARTURE	220	101	228	168	106	432	823	1,256	1,782
% OF NORM	161%	128%	354%	443%	182%	570%	184%	217%	198%
MAR 2011	1,049	1,567	1,806	686	392	1,152	5,501	6,653	10,262
NORMAL	596	1,003	567	209	206	299	2,581	2,880	4,707
DEPARTURE	453	564	1,239	477	186	853	2,920	3,773	5,555
% OF NORM	176% (Forecast)	156%	319%	328%	190%	385%	213%	231%	218%
APR 2011	668	1,964	704	207	301	1,279	3,844	5,123	15,385
NORMAL	649	1,080	481	144	180	360	2,534	2,894	7,601
DEPARTURE	19	884	223	63	121	919	1,310	2,229	7,784
% OF NORM	103%	182%	146%	144%	167%	355%	152%	177%	202%
MAY 2011	1,314	1,355	400	147	186	700	3,402	4,102	19,487
NORMAL	1,081	1,245	312	147	186	292	2,971	3,263	10,864
DEPARTURE	233	110	88	0	0	408	431	839	8,623
% OF NORM	122%	109%	128%	100%	100%	240%	115%	126%	179%
JUN 2011	1,969	2,916	460	152	178	350	5,675	6,025	25,512
NORMAL	1,612	2,667	423	152	178	286	5,032	5,318	16,182
DEPARTURE	357	249	37	0	0	64	643	707	9,330
% OF NORM	122%	109%	109%	100%	100%	122%	113%	113%	158%
JUL 2011	997	1,946	185	57	137	250	3,322	3,572	29,084
NORMAL	819	1,776	179	57	137	218	2,968	3,186	19,368
DEPARTURE	178	170	6	0	0	32	354	386	9,716
% OF NORM	122%	110%	103%	100%	100%	115%	112%	112%	150%
AUG 2011	353	604	65	39	115	150	1,176	1,326	30,410
NORMAL	353	604	65	39	115	131	1,176	1,307	20,675
DEPARTURE	0	0	0	0	0	19	0	19	9,735
% OF NORM	100%	100%	100%	100%	100%	115%	100%	101%	147%
SEP 2011	333	452	111	38	111	110	1,045	1,155	31,565
NORMAL	333	452	111	38	111	99	1,045	1,144	21,819
DEPARTURE	0	0	0	0	0.	11	0	11	9,746
% OF NORM	100%	100%	100%	100%	100%	111%	100%	101%	145%
OCT 2011	385	523	66	5	120	86	1,099	1,185	32,750
NORMAL	385	523	66	5 5	120	78	1,099	1,177	22,996
DEPARTURE	0	0	0	0	0	8	0	8	9,754
% OF NORM	100%	100%	100%	100%	100%	110%	100%	101%	142%
NOV 2011	384	398	67	6	118	83	973	1,056	33,806
NORMAL	384	398	67	6	118	76	973	1,049	24,045
DEPARTURE	0	0	0	0	0	7	0	7	9,761
% OF NORM	100%	100%	100%	100%	100%	109%	100%	101%	141%
DEC 2011	329	247	0	12	100	56	688	744	34,550
NORMAL	329	247	0	12	100	52	688	740	24,785
DEPARTURE	0	0	0	0	0	4	0	4	9,765
% OF NORM	100%	100%	100%	100%	100%	108%	100%	101%	139%
Calendar Year Totals									
110717:-	8,791	12,729	4,303	1,653	2,061	5,013	29,537	34,550	
NORMAL	7,213	10,612	2,373	883	1,681	2,023	22,762	24,785	
DEPARTURE	1,578 122%	2,117	1,930 181%	770 187%	380	2,990 248%	6,775 130%	9,765 139%	
% OF NORM	12270	120%	10170	187%	123%	24070	13070	13770	

April 2011 Calendar Year Runoff Forecast

2011 March Runoff

March 2011 runoff above Sioux City, IA, was 231% of normal at 6653 KAF, and above Gavins Point Dam runoff was 213% of normal at 5501 KAF. The actual March runoff into the system was 2451 KAF greater than forecasted March runoff above Gavins Point. Fort Peck received 1049 KAF (176%), Garrison received 1567 KAF (156%), Oahe received 1806 KAF (319%), Fort Randall received 686 KAF (328%), Gavins Point received 392 KAF (190%), and the Sioux City reach received 1152 KAF (385%).

Antecedent Moisture & Precipitation

Soil moisture conditions on March 31, 2011, continue to rank very high in the Northern Plains including eastern Montana and the Dakotas, and the Northern Rockies in Montana and northwest Wyoming (Figure 1). Soil moisture conditions rank in at least the 70th percentile, with particularly wet areas ranking 90 percent or higher. The Upper Missouri basin in the Northern Rockies, northern Montana, northern North Dakota, and eastern South Dakota all rank in the 95th percentile or higher. Wetter than normal soil conditions are also present northern Nebraska and northwest lowa. Drier than normal soil conditions have developed in eastern Colorado, western Kansas and a small portion of central Missouri.

Thirty day precipitation departures as a percent of normal ending on March 31, 2011 is shown in Figure 2. A large area extending from eastern Montana through central North Dakota, also including northeast Wyoming, and western and northern South Dakota received greater than 150% of normal precipitation in March. A large area within this region including northeast Montana, and western and central North Dakota has been very wet, receiving over 200% of normal precipitation with some areas receiving over 300% of normal precipitation. In other areas such as central South Dakota, Nebraska, lowa, and Kansas, precipitation was less than 75% or normal in March.

Mountain Snow Pack

Mountain snowpack as of March 31, 2011 was 116% of normal above Fort Peck and 112% of normal in the Fort Peck to Garrison reach. This is an increase from 110% of normal above Fort Peck and 108% of normal in the Fort Peck to Garrison reach on February 28, 2011. Missouri River Basin mountain snowpack normally peaks near on April 15. By April 1, normally 96% of the peak accumulation has occurred. The current SWE accumulations in each reach are greater than the normal annual peak accumulations.

Plains Snow Pack

The Plains snow pack on April 1, 2010, contains pockets of relatively heavy snow cover within a light to average cover extending from north central Montana through eastern Montana and across the Dakotas. Very little snow cover exists in lowa or Nebraska. Snow water equivalent conditions are shown in Figures 3 and 4. Figure 3 shows the plains SWE in inches on March 31, 2011. Figure 4 shows the plains SWE on March 10, 2011, which is near the date of peak SWE accumulation prior to the snowmelt that melted a majority of the snow in South Dakota.

Above Fort Peck Lake, the snow cover has thinned significantly; however, 1-2 inch amounts of SWE remain in central Montana, and trace amounts of SWE remain south of the reservoir.

The Fort Peck to Garrison reach contains the greatest amounts of plains snow with very heavy pockets of SWE remain in the Milk River Basin and tributary basins primarily north of the Missouri River extending into north central North Dakota. Very limited snowmelt has occurred in the Fort Peck to Garrison reach north of the Missouri River; however, south of the River in the lower Yellowstone and Little Missouri River basins, some snowmelt and runoff has occurred. SWE amounts in the Milk River Basin range from 2.5 to 4.5 inches according to measurements, while in the Missouri River reach from Fort Peck to Williston, 2-4 inches of SWE remain. NOAA's NOHRSC office is estimating heavy pockets of 6-8 inches of SWE in the Milk River Basin in Canada and in an areas extending from east of Fort Peck, northwestward into Canada (Figure 3). In the lower Yellowstone and Little Missouri River Basins, snow cover is sparse, yet some remaining SWE and meltwater has not reached rivers and streams. Snow conditions at the end of March bare similarities to the mid-March SWE in the Garrison reach that was present in 1969.

In the Oahe reach, much of the snow in the tributaries west of the Missouri River has melted leaving only heavy pockets in tree rows and protected areas. Only a trace to 1-inch amounts covers the plains as a result of recent light snow. Areas within the Knife and Heart River Basins in North Dakota still contain small pockets of 2-3 inches of SWE (adjusted down from NOHRSC estimates). In the Oahe to Gavins Point reaches, trace to 0.5-inch amounts exist as a result of recent snows.

In the Gavins Point to Sioux City reach, a trace to 0.5-inch coverage exists in the James and Big Sioux River Basins south of U.S. Highway 212 that runs through Watertown, SD. In mid-March most of the plains snow melted as a result of warmer temperatures. In northern South Dakota and North Dakota, very limited snowmelt occurred in March, so with the approach of warmer temperatures at the end of March and beginning of April, snowmelt in the Big Sioux and the James River north of U.S. 212 will recommence. SWE in the upper James River Basin ranges from 2.5-5 inches according to on the ground measurements, while in the Big Sioux north of Watertown, SWE ranges from 3-4 inches.

Climate Outlook

During the next five days temperatures in the Missouri Basin will be normal in southern portions of the basin; however colder temperatures will prevail in the Northern Plains with daily high temperatures expected to be 5-10 degrees Fahrenheit below normal. During the 6-10 day period, temperatures will continue to be below normal through the Northern Plains and Rockies, and normal in the lower basin. Through the remainder of April, temperatures will trend below normal (Figure 5).

In terms of precipitation, during the next five days, the Missouri Basin will receive light precipitation in the Central Plains; however, a powerful winter storm will produce heavy snow in the Northern Rockies and a mix of rain and snow in the Northern Plains. During the 6-10 day period, the Northern Plains could continue to receive precipitation while the southern half of the Missouri River Basin will likely be dry. Through the end of April, the wet conditions in the north and dry conditions in the south are expected to continue (Figure 6).

During the April-June period, temperatures are forecast to trend below normal from the Midwest to the Northern Rockies. Precipitation chances are forecast to be normal throughout the basin with the exception of above normal chances in North Dakota and northeast Montana. In relation to drought, normal (non-drought) hydrologic conditions are expected to prevail in the Dakotas, Wyoming, Montana and Iowa through June (Figure 7). Moderate to severe drought already affecting eastern Colorado and western Kansas are expected to persist, while abnormally dry conditions and moderate drought will continue to develop in southern Nebraska and central Kansas.

April 2011 Calendar Year Runoff Forecast

The overall calendar year 2011 runoff forecast is 29.5 MAF (130% of normal) above Gavins Point Dam, which is an increase of 3.95 MAF from the March 2011 forecast. This increase is due in part to actual March runoff being higher than forecasted March runoff, an increase in forecasted runoff into the Garrison reach, and an increase in the expected mountain snowmelt runoff due to increased mountain SWE. The summation above Sioux City is 34.6 MAF (139% of normal), an increase of 4.6 MAF.

Remaining plains snow pack (2.5-4.5 inches of SWE) in the Fort Peck to Garrison reach north of the Missouri River has not melted, and as a result Garrison is expected to receive up to 2.0 MAF of runoff in the month of April, which represents about 1.0 inch of snowmelt runoff from the contributing area covered with snow (35,000 square miles). The total March-April runoff forecast into Garrison is 3.5 MAF. Similar runoff volumes occurred in March and April of calendar years 1949 (2.9 MAF), 1960 (2.8 MAF), 1969 (3.4 MAF), and 1979 (4.5 MAF), which were all impacted by moderate to heavy plains snow in the Garrison reach.

Mountain snow accumulations as a percent of long-term averages are 116% of normal above Fort Peck and 112% of normal in the Fort Peck to Garrison reach. As a result, the May-July runoff above Fort Peck is expected to be 122% of normal, while the Fort Peck to Garrison reach is expected to receive 110% of normal runoff using snow to runoff regression equations. Runoff in all reaches above the System are forecasted to return to normal by August 2011, while above average runoff is forecasted in the Gavins to Sioux City reach due to persistently high streamflow conditions.

Calculated Soil Moisture Ranking Percentile MAR 30, 2011

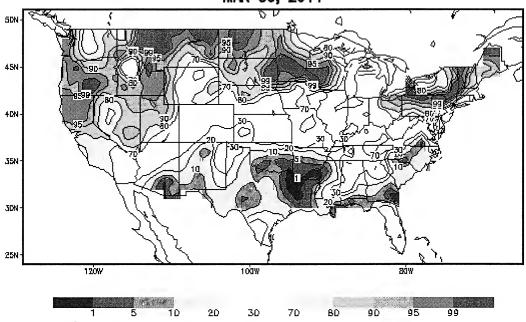


Figure 1 March 30, 2011 Soil Moisture Ranking Percentile.

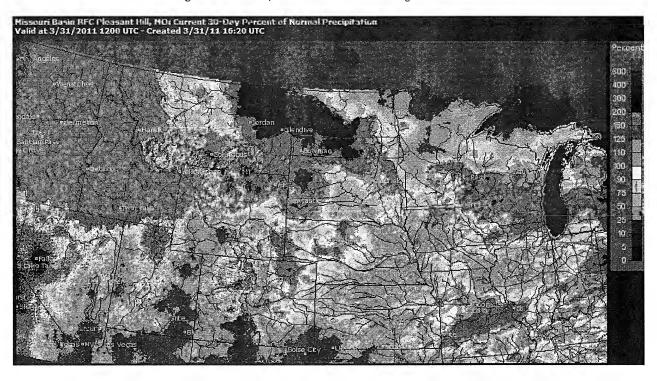


Figure 2 30-day precipitation as a percent of normal, ending March 31, 2011.

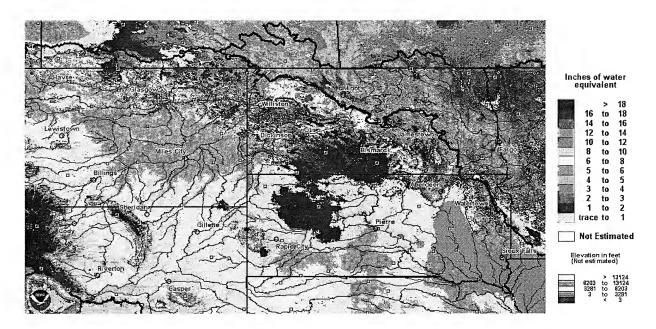


Figure 3 Plains Snow Water Equivalent on March 31, 2011.

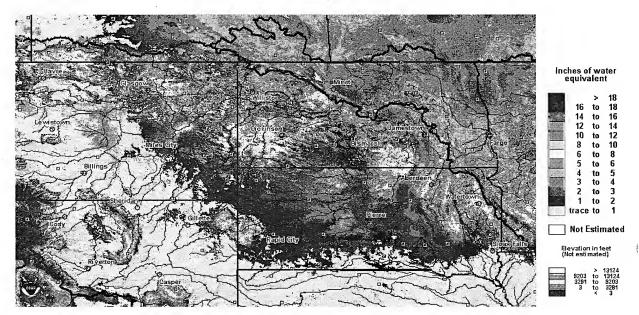


Figure 4 Plains Snow Water Equivalent on March 10, 2010.

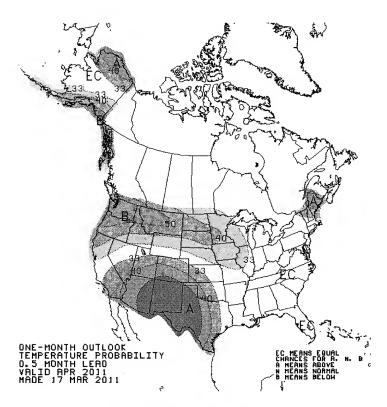


Figure 5 April 2011 temperature outlook.

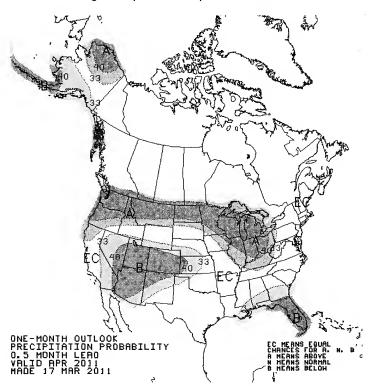


Figure 6 April 2011 precipitation outlook

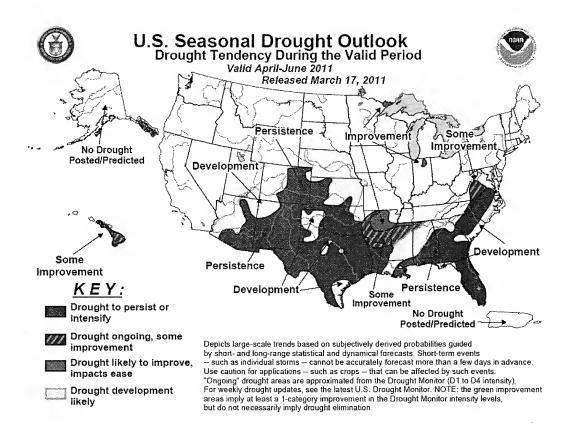


Figure 7 U.S. Drought Outlook through June 2011.



Farhat, Jody S NWD02

Sent:

Monday, April 04, 2011 4:29 PM

To: Cc: Anderson, G Witt NWD

Subject:

No May Pulse? (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

(and Witt, if you're still monitoring email)-

Due to high system storage and above normal forecasted runoff, we are increasing our service level tomorrow by 10,000 cfs to start evacuating flood waters from the mainstem reservoir system. This means that all of the navigation targets are increased by 10,000 cfs, however the downstream flow limits for the spring pulse are not. And since our window of opportunity between the navigation target and the downstream flow limit was only 10,000 cfs at Omaha and Nebraska City, that window is now closed.

I just wanted to give you a heads up since, unless you object (or want to participate?), I plan on giving the FWS a call tomorrow to update them, and followed by an email to our spring pulse coordination list (Congressional staffers, state folks, etc). We would then plan on making the decision public in our regular monthly press release that will go out later this week.

If you have any questions or would like to discuss, give me a call anytime.

Jody

Office: 402-996-3840 Cell: 402-350-1417 Home:

Classification: UNCLASSIFIED

NWO

From:

Sent:

To: Subject:

Attachments:

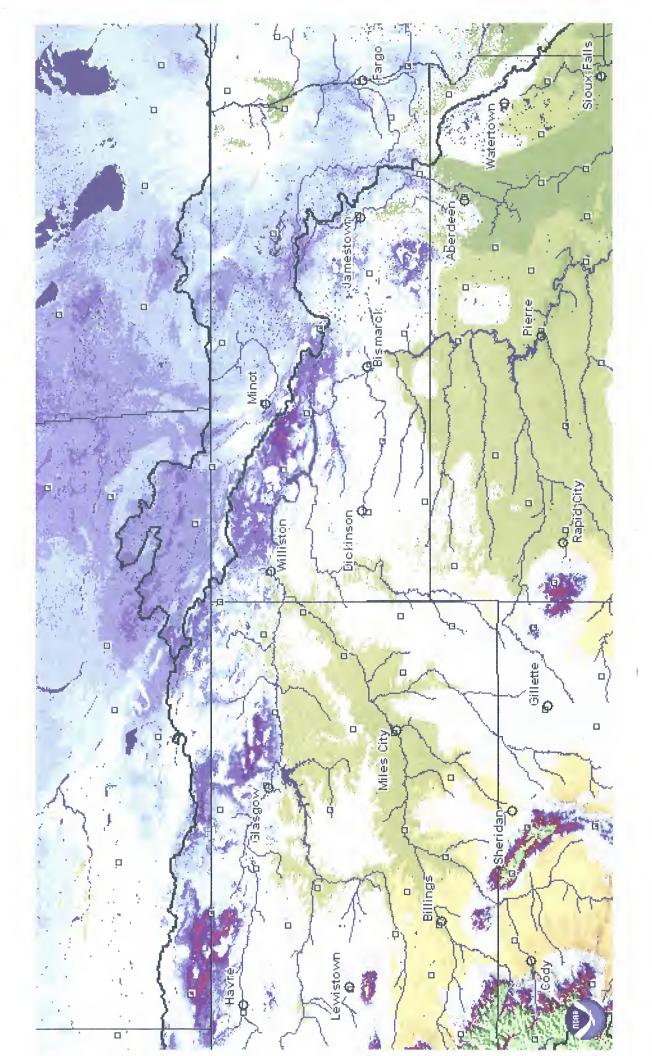
Farhat, Jody S NWD02 Monday, April 04, 2011 4:55 PM Farhat, Jody S NWD02 Snow Water Equivalent (UNCLASSIFIED) swe_shallow.2011040415.1.800.450.304.1914.1268.3629.dem.shading.cefilm.m.0.0.0.0.0.0.p

ng

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED



NWO

From:

Sent:

Farhat, Jody S NWD02 Monday, April 04, 2011 4:56 PM

To:

Farhat, Jody S NWD02

Subject:

Emailing: legend_swe_shallow_dem_152_402_0_0_0_0.png (UNCLASSIFIED) legend_swe_shallow_dem_152_402_0_0_0_0.png

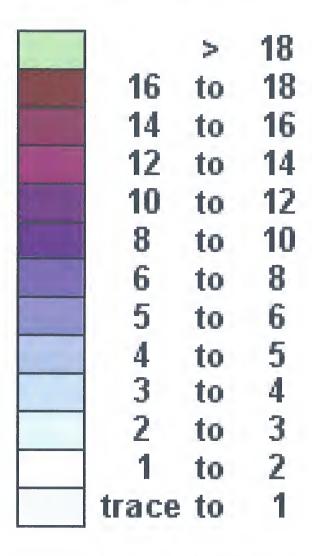
Attachments:

Classification: UNCLASSIFIED

Caveats: NONE

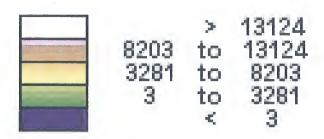
Classification: UNCLASSIFIED

Inches of water equivalent



Not Estimated

Elevation in feet (Not estimated)



NWO

Sent:

Monday, April 04, 2011 4:25 PM

To: Subject:

Farhat, Jody S NWD02 Forecast (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: FOUO

Jody,

I have heard from both Ft. Peck and Oahe, since we had the forecast call this afternoon. We're all concerned about being in our exclusive flood control zones and the impacts that has to our operations, but what concerns me more is the feedback that I'm hearing; "it doesn't matter what we say, so we may as well keep our mouths shut"...

We are not hydrologists, but have a pretty good feel for the local conditions and have quite a bit of experience in dealing with the reservoirs. Comments like, "the snow pack above Oahe is gone" raise a concern for us when we know better. It might be a small percentage of the Oahe drainage basin, but it's not gone.

I guess that I'm concerned that the OPM's will not even bother to call in, or provide input, if they feel like they're not being heard? That we will not fostering improved working relationships, or improve our forecasts.

One thing that I'm wondering about is how we account for expected precipitation in the forecasts. Is there a better way than figuring "average"? It just seems to me that when we're in a drought cycle we over estimate the precip and when we're in a wet cycle we underestimate it. I know there's more to it, but continued adjusting of the forecasts up, or down, throughout a year create issues for managing our projects. I'm simply looking for ways to improve the process and do not want the relationships to go downhill.

My intent is NOT to tell you how to do your job, rather to ensure that we all continue to work on the same team...

Classification: UNCLASSIFIED

Caveats: FOUO

NWO

From:

NWD02

Sent:

Monday, April 04, 2011 3:14 PM

To:

NWD02; 'kinney@wapa.gov'; 'bcallies@wapa.gov'; Farhat, Jody S NWD02; NWD02;

NWD02;

'shimek@wapa.gov'

Subject:

April 2011 Reservoir Regulation Studies Graphics and Statistics (UNCLASSIFIED)

Attachments:

resfcastapr.pdf; WAPAMNTH-11-APR.xlsx; WAPA.MonthlyStudies.Graphic.APR.2011.pptx

Classification: UNCLASSIFIED

Caveats: NONE

Everyone,

Here are the April 2011 study graphics and statistics.

If you have any questions please contact me.

Thanks,

Hydraulic Engineer Missouri River Basin Water Management Division

Classification: UNCLASSIFIED

Caveats: NONE

APR 1, 2011 / BASIC CONDITION / 33.8 MAF / BALANCED FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE Elevations & Storages are for Date Shown Avg Discharge & Energy are Monthly Values Date of Study: April 1, 2011

				Date of	Study:	April 1,	2011				2012	
	31-Mar-11	30-Apr	2011 31-May	30-Jun	31-Jul	31-Aug	30-Sep	31-0ct	30-Nov	31-Dec	2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS	2238.7 7.4	2239.7	2241.0 10.5	2243.9 11.0	2243.9 11.0	2242.0 11.0	2240.6 10.5	2239.3 10.0	2238.3 10.0	2236.8 12.0	2235.3 13.0	2234.0 13.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1843.7 15.0	1845.0 22.0	1848.0 29.0	1848.6 29.0	1846.6 29.0	1844.6 29.6	1842.2 30.5	1840.1 30.5	1839.7 19.0	1838.4 25.0	1837.5 25.0
OAHEELEV FTMSL DISCH KCFS	1614.3 13.9	1616.0 15.9	1615.7 28.4	1615.7 34.2	1614.2 37.1	1612.1 38.0	1609.8 41.8	1609.1 33.4	1607.9 36.1	1606.7 24.9	1606.9 23.6	1607.5 22.7
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 16.4	1420.0 28.4	1420.0 34.2	1420.0 37.0	1420.0 37.6	1420.0 41.4	1420.0 33.1	1420.0 35.8	1420.0 24.7	1420.0 23.6	1420.0 22.7
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1357.0 20.9	1355.2 33.2	1355.2 36.5	1355.2 37.5	1355.2 37.6	1353.5 43.8	1345.0 43.2	1337.6 43.3	1339.4 23.0	1344.9 18.2	1350.1 17.0
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 25.0	1206.0 35.5	1206.0 39.0	1206.0 39.0	1206.5 39.0	1207.5 45.0	1207.5 45.0	1207.5 45.0	1207.5 25.0	1207.5 20.0	1206.0 20.0
SYSTEM STORAGE 1000 AF ENERGY GWh PEAK POWER MW	61720 11089	63480 607 2389	63965 994 2397	65694 1128 2401	65376 1211 2394	63533 1219 2381	61633 1241 2370	59661 1162 2344	57931 1135 2293	57180 819 2293	56853 821 2314	56834 752 2320
							C / 25.7			0 (CNIC)		
	31-Mar-11	30-Apr	2011								2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS	2238.7 7.4	2238.6 7.0	2238.0 11.0	2238.8 9.0	2237.7 9.0	2235.9 9.0	2234.9 7.5	2234.5 6.0	2233.9 6.3	2232.6 9.0	2230.9	2229.4 11.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1842.0 15.0	1842.4 19.5	1843.9 22.0	1843.4 22.0	1841.7 22.0	1840.5 19.3	1839.4 16.5	1838.6 16.5	1837.2 19.0	1835.2 24.0	1833.7 24.0
OAHE ELEV FTMSL DISCH KCFS	1614.3 13.9	1614.9 18.6	1613.6 28.9	1612.3 31.6	1609.9 33.7	1607.0 33.6	1604.5 30.8	1603.1 22.1	1602.3 19.5	1602.3 17.9	1602.8 21.1	1603.6 20.4
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 19.1	1420.0 28.9	1420.0 31.6	1420.0 33.6	1420.0 33.2	1420.0 30.3	1420.0 21.7	1420.0 19.1	1420.0 17.6	1420.0 21.1	1420.0 20.4
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1357.0 22.4	1355.2 32.7	1355.2 32.9	1355.2 33.7	1355.2 33.0	1353.5 32.5	1345.0 31.7	1337.5 26.5	1339.3 15.9	1344.8 15.7	1350.0 14.5
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 25.0	1206.0 33.9	1206.0 34.3	1206.0 34.3	1206.5 34.0	1207.5 33.5	1207.5 33.1	1207.5 28.2	1207.5 17.0	1207.5 17.0	1206.0 17.0
SYSTEMSTORAGE 1000 AF ENERGY GWh PEAK POWER MW	61720 9061	62283 650 2369	61714 971 2376	61908 978 2377	60676 1040 2363	58846 1028 2332	57374 911 2318	55871 775 2296	54809 668 2255	54167 632 2256	53719 736 2276	53568 ¹ 673 2282
							C / 43.0					
	31-Mar-11	30-Apr	2011		·		DAYS /			31-Dec	2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS		V-	_			_	2242.8					
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1842.7 25.5	1843.0 40.0	1848.8 40.0	1850.2 40.0	1848.0 40.0	1845.6 41.5	1843.0 41.5	1841.0 40.3	1840.4 22.0	1838.7 28.0	1837.5 28.0
OAHE ELEV FTMSL DISCH KCFS	1614.3 13.9	1616.8 23.7	1616.8 47.3	1617.5 45.9	1615.4 53.5	1613.1 50.9	1610.7 55.3	1609.6 47.3	1608.0 49.7	1606.8 28.0	1606.9 27.2	1607.5 26.1
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 24.2	1420.0 47.3	1420.0 45.9	1420.0 53.4	1420.0 50.7	1420.0 55.0	1420.0 47.0	1420.0 49.6	1420.0 27.9	1420.0 27.2	1420.0 26.1
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1358.0 27.6	1362.0 44.6	1362.0 49.8	1360.0 57.3	1355.2 57.7	1353.5 57.7	1345.0 57.3	1337.5 57.3	1339.3 26.3	1344.8 21.9	1350.0 20.6
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 32.0	1206.0 48.0	1206.0 54.0	1206.0 59.5	1206.5 59.5	1207.5 59.5	1207.5 59.5	1207.5 59.5	1207.5 29.0	1207.5 24.0	1206.0 24.0
SYSTEMSTORAGE 1000 AF ENERGY GWH PEAK POWER MW	61720 13882	63881 868 2384	64728 1462 2350	68409 1419 2361	67867 1561 2369	65166 1525 2385	62765 1510 2373	60233 1455 2352	58036 1391 2291	57318 917 2295	56888 927 2314	56830 848 2320

4 PAGE

STUDY NO

FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE
VALUES IN 1000 AF EXCEPT AS INDICATED TIME OF STUDY 15:01:38 31MAR11 INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB -FORT PECK-492 483 6174 7188 -1014 15803 2238.7 7.4 234 30 674 676 -2 16991 2243.9 11.0 -42 101 326 615 -289 15941 2239.3 10.0 NAT INFLOW DEPLETION EVAPORATION -75 117 291 623 -332 16230 -22 24 100 159 -59 -132 51 410 738 11 94 -41 45 187 -19 21 88 298 525 -153 -118 643 938 417 646 226 292 16029 16322 2239.7 2241.0 7.0 10.5 655 671 16993 2243.9 11.0 676 -429 16562 2242.0 11.0 799 -334 15059 748 -270 14789 MOD INFLOW -110 15831 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -328 15393 -51 15780 2238.8 2240.6 2238.6 2238.3 2236.8 POWER AVE POWER MW PEAK POW MW ENERGY GWH 166 69.8 169 109.7 166 49.7 166 23.2 162 113.2 168 167 166 164 1176.6 107.8 114.0 113.6 104.4 103.0 120.1 121.8 --GARRISON-NAT INFLOW DEPLETION CHAN STOR 980 -55 552 16195 17131 -937 19049 1840.5 21.8 -115 -20 57 1023 1168 177 -34 765 -5 -142 5 135 1087 -25 5 602 -121 -56 -57 107 -65 0 27 -3 4 -87 -10 1064 1783 -719 21110 1846.6 29.0 115 1053 1875 -823 19615 842.2 30.5 265 423 -159 19115 1840.7 EVAPORATION REG INFLOW RELEASE 1986 1783 567 907 1726 1075 21627 848.0 29.0 1 958 893 484 437 20552 1845.0 22.0 17 60 -673 204 37 1844 .6 29 .6 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS 20115 1843.7 21830 1848.6 29.0 -341 19274 .841.2 30.5 -145 18789 1839.7 19.0 -400 18389 838.4 25.0 -181 18934 1840.1 1837.5 15.0 30.5 POWER AVE POWER MW PEAK POW MW ENERGY GWH 499 2649.4 137.6 502 270.5 502 282.2 501 281.1 499 274.6 38 9 48 8 289.1 476 178.2 500 210.3 481 232.6 216.2 138.8 64.6 NAT INFLOW DEPLETION CHAN STOR EVAPORATION -10 -4 110 1837 71 -25 18 -24 173 1 45 56 1146 1531 -385 18588 1606.7 24.9 0 23 416 493 -77 19168 1608.6 35.5 -10 534 18061 20317 25 -25 1761 2279 -518 21043 1614.2 37.1 1626 2335 -708 20335 1612.1 38.0 -2 129 1712 2487 -776 19559 1609.8 41.8 475 670 -195 18973 1607.9 890 EVAPORATION
REG INFLOW
RELEASE
STOR CHANGE
STORAGE
ELEV FTMSL
DISCH KCFS
POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH 944 575 21668 1616.0 15.9 1745 -89 21579 1615.7 28.4 2033 -18 21561 1615.7 34.2 -95 19245 1608.8 33.1 -219 19340 192 18837 18645 1606.9 -2256 21093 1614.3 13.9 1609.1 42.2 732 373.4 750 329.7 743 367.9 716 323.2 715 154.6 704 238.7 3228.9 153.5 283.8 393.0 104.3 225.6 204.0 -BIG BEND-2315 2315 1621 1420.0 37.6 EVAPORATION REG INFLOW RELEASE 1520 1520 1621 120.0 24.7 2273 2273 1621 2463 2463 1621 2035 2035 976 976 1621 488 488 664 664 1621 974 1621 1420.0 16.4 17 45 17 45 1621 1420.0 28.4 2033 1621 1450 1621 1420.5 17.2 STORAGE ELEV FTMSL DISCH KCFS 1420.0 35.2 420.0 1420.0 420.0 41.4 420.0 20.0 1420.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 509 98.8 509 115.1 509 128.7 509 131.0 517 141.0 538 120.0 538 39.8 538 92.0 58.7 85.9 75.8 1170.6 54.4 --FORT RANDALI NAT INFLOW DEPLETION EVAPORATION REG INFLOW RELEASE 3 10 1521 1414 107 2408 339.4 23.0 77 117 18 8 12 15 25 7 2014 2656 -642 2764 2039 -156 3549 1355.2 33.2 2173 0 3549 355.2 36.5 1289 -320 2443 1122 350 2758 1242 2304 2313 24 62 26 07 601 687 980 STOR CHANGE STORAGE -638 3770 1357.7 15.1 -145 3405 1353.5 43.8 23 01 1337 . 6 43 . 3 -65 3705 -116 23273 5 5 0 ELEV FTMSL DISCH KCFS 1357.0 55.2 37.5 1355.2 1345.0 40.1 1338.1 44.9 18.2 POWER AVE POWER MW PEAK POW MW ENERGY GWH 362 129.4 356 208.9 356 220.6 356 233.8 356 234.7 350 245.4 319 240.6 297 108.2 288 48.3 294 125.1 319 103.0 339 2046.8 --GAVINS POINT-NAT INFLOW DEPLETION 3 0 2 19 -24 24 -6 39 -2 10 0 6 2411 2398 5 0 2 0 2 625 625 10 38 115 27 03 2678 25 380 1207.5 45.0 -11 CHAN STOR EVAPORATION REG INFLOW RELEASE -5 36 22815 22827 2767 2767 1537 1488 2183 2321 2398 1339 714 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -12 342 1206.0 25.0 355 1206.5 39.0 -12 354 1206.5 21.0 1206.0 35.5 1206.0 39.0 1206.0 39.0 1207.5 45.0 1207.5 45.0 1207.5 45.0 1207.5 45.0 1207.5 25.0 1207.5 20.0 20.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 114 61.9 $\begin{array}{c} 70\\114\\48.7\end{array}$ 117 65.3 114 82.1 114 84.8 115 85.1 116 82.9 116 86.2 116 41.7 116 19.5 116 22.3 117 52.5 817.0 84.0 --GAVINS POINT - SIOUA 1279
NAT INFLOW 3196 1279
DEPLETION 252 22
REGULATED FLOW AT SIOUX CITY
KAF 25771 2745
46.1 36 31 39 36 24 11 3 14 13 14 44.4 42.4 46.2 46.2 25.7 20.4 21.4 40.9 27 64 46 .4 46.2 46.2 46.3 --TOTAL--NAT INFLOW -69 0 78 -79 -1 -63 -209 65 189 DEPLETION CHAN STOR EVAPORATION -68 1825 61720 -83 -36 -2 115 65376 18 0 -163 -149 0 -204 -25 -130 63533 STORAGE SYSTEM POWER 63.480 5 6853 AVE POWER MW PEAK POW MW ENERGY GWH 2389 606.6 20.2 2397 993.7 32.1 2401 1127.7 37.6 2394 1211.3 39.1 2381 1218.9 39.3 2370 1241.3 41.4 2301 262.1 37.4 2293 320.8 40.1 2314 821.3 26.5 2293 2320 2344 2312 11089.3 1162.0 37.5 551.8 819.4 752.2 25.9 DAILY GWH 26.4

30SEP

310CT

1.5NOV

22 NOV

30NOV

31DEC 31JAN

29 FEB

INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG

TNT-SUM 30APR

31MAY

30JUN 31JUL 31AUG

30SEP

310CT

15NOV

22 NOV

30NOV

31DEC 31JAN

29 FEB

FULL SERV / SHTN NAV SEAS 0 DAYS / PULSE MAY 16.9 (CALC) VALUES IN 1000 AF EXCEPT AS INDICATED TIME OF STUDY 15:01:52 AR11 2011 INI-SUM 30APR 31MAY 31MAR11 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB --FORT PECK--NAT INFLOW DEPLETION 219 35 309 553 -245 15579 2237.7 9.0 -108 137 237 446 -209 14988 2234.9 7.5 -90 119 279 369 -90 14899 2234.5 6.0 -24 54 124 179 -55 14844 2234.3 6.0 -11 25 58 83 -25 14819 2234.1 6.0 408 568 -13 28 38 405 -80 61 -69 -55 195 EVAPORATION 676 -129 15653 2238.0 11.0 536 170 15824 2238.8 9.0 676 -357 14145 2230.9 11.0 553 -382 15197 2235.9 9.0 553 -272 14502 MOD INFLOW RELEASE 5786 417 111 633 STOR CHANGE STORAGE 2233.9 7.0 -1948 15803 2238.7 7.4 15 782 2238.6 7.0 -290 13855 ELEV FTMSL DISCH KCFS 2232.6 POWER AVE POWER MW PEAK POW MW ENERGY GWH 166 69.7 165 111.6 166 89.5 165 92.4 164 92.0 163 73.9 61.1 162 29.5 162 13.8 162 18.3 161 91.0 952.7 108.8 101.2 --GARRISON-NAT INFLOW DEPLETION CHAN STOR 200 15 137 644 1015 -370 18696 1839.4 16.5 3 62 -1 07 15 -93 -52 -20 69 714 -43 $^{21}_{4}$ $\frac{111}{-39}$ 19 -50 -10 -22 -20 -121187 1353 -166 20000 1843.4 22.0 796 1353 -557 19444 1841.7 22.0 160 770 1147 -377 19067 1840.5 19.3 172 229 -57 18518 1838.8 -10 32 203 262 -59 18459 1838.6 16.5 EVAPORATION REG INFLOW RELEASE 11191 13274 369 -454 18005 1837.2 19.0 505 19554 1842.0 15.0 140 19694 1842.4 19.5 472 20166 1843.9 22.0 -588 17417 335.2 24.0 -122 18575 1839.0 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -2083 19049 1840.5 21.8 16.5 16.5 24.0 POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH 485 2020.0 137.0 483 208.3 474 74.7 499 202.2 479 175.6 475 155.1 472 39.7 467 176.1 454 203.1 491 219.5 184.5 209.5 34.8 -OAHE-28 11 150 1069 1835 -766 17915 1604.5 30.8 -10 11 127 962 1361 -399 17516 1603.1 22.1 NAT INFLOW DEPLETION CHAN STOR EVAPORATION 49 25 71 -16 145 -9 18 -21 1 0 1 28 173 116 -10 620 13393 16824 -3431 21093 -12 -10 65 1165 2068 -903 18681 1607.0 33.6 1250 2072 -822 19584 1609.9 33.7 215 310 -95 17293 460 1879 -449 20406 1612.3 31.6 1776 258 1099 -19 17261 1 425 1 172 253 17 662 REG INFLOW RELEASE STOR CHANGE STORAGE -128 17388 1602.7 148 17409 21279 1614.9 18.6 -425 20854 -13 17280 ELEV FTMSL DISCH KCFS POWER 1614.3 13.9 1613.6 1602.4 1602.3 16.3 1602.8 1603.6 19.8 AVE POWER MW PEAK POW MW ENERGY GWH 746 179.2 720 328.4 692 283.1 682 89.7 681 47.1 680 39.3 680 167.2 28 0 68 5 683 733 705 2629.8 286.5 301.0 323.4 208.4 197.5 178.9 BIG BEND 2044 2044 1621 1420.0 33.2 1334 1334 1621 420.0 21.7 EVA PORATION 18 04 18 04 576 576 304 1085 1085 1621 1776 1621 1420.0 28.9 252 1621 1420.0 15.9 16725 1135 1621 2064 1621 20.0 1299 1621 1879 1172 1621 REG INFLOW RELEASE 420.0 31.6 420.0 30.3 STORAGE ELEV FTMSL DISCH KCFS 1420.5 17.2 1420.0 21.9 1420.0 20.0 420.0 1420.0 33.6 19.4 POWER AVE POWER MW PEAK POW MW ENERGY GWH 509 100.6 509 106.4 509 116.9 509 115.7 517 103.4 538 79.1 538 18.5 538 77.1 8 9 538 35.0 15.4 68.0 66.1 965.6 63.4 -FORT RANDALL NAT INFLOW DEPLETION 12 18 10 15 32 1 12 3 **EVAPORATION** 2011 -156 3549 1355.2 32.7 1934 -146 3402 353.5 32.5 1949 -643 2759 887 -322 2437 416 -116 2321 2 48 274 - 26 22 95 108 0 97 8 10 2 23 9 7 966 350 2747 REG INFLOW RELEASE 17637 1331 1958 2070 2 0 2 8 2 0 2 8 374 3121 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -649 3770 1357.7 15.1 1355.2 33.7 1355.2 33.0 -65 3705 355.2 32.9 1357.0 345.0 31.7 40.0 1337.9 1337.5 .339.3 15.9 344.8 15.7 1350.0 17.3 POWER AVE POWER MW PEAK POW MW ENERGY GWH 362 1742.5 138.6 356 206.1 356 199.2 356 210.4 356 206.3 25 4 31 9 188.7 296 81.0 285 24.1 319 88.7 350 195.4 287 293 86.8 339 80.3 36.8 --GAVINS POINT-NAT INFLOW DEPLETION 5 3 1 0 2 1 0 2 433 433 3 24 2 317 317 10 115 24 39 -1 -5 1 5 19 10 CHAN STOR EVAPORATION Ō -14-20 Ō 8 2104 2091 13 355 1206.5 34.0 2035 2035 EVAPORATION REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FIMSL DISCH KCFS 2084 2109 928 1045 978 2041 1045 25 380 1207.5 33.5 -12 354 1206.5 -12 342 1206.0 -38 342 1206.0 17.0 1206.0 33.9 1206.0 34.3 1206.0 34.3 1207.5 33.1 207.5 31.2 1207.5 31.2 1207.5 20.0 1207.5 17.0 207.5 17.0 21.0 25.0 POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH 114 41.5 117 13.5 $^{60}_{117}_{44.7}$ 114 82.2 $\frac{110}{115}$ $\frac{111}{114}$ 750.4 61.9 81.6 79.6 82.1 79.8 82.5 38.3 17.9 --GAVINS POINT - S100...

NAT INFLOW 2104 831

DEPLETION 252 22

REGULATED FLOW AT SIOUX CITY

KAF 20441 2297
38.6 31 39 36 24 6 3 3 36 11 13 14 14 18.0 37.3 35.4 40.1 36.1 34.6 34.0 32.1 32.1 20.9 --TOTAL---22 2 -1 138 60676 -66 28 451 55871 -49 0 92 54 952 -55 14 105 54809 DEPLETION CHAN STOR EVAPORATION -46 2167 61720 -161 26 527 -94 -28 227 15 4 41 -75 -104 -55 -41 STORAGE STORAGE SYSTEM POWER AVE POWER MW PEAK POW MW ENERGY GWH DAILY GWH 2369 649.8 21.7 2376 970.9 31.3 2377 977.8 32.6 2332 1027.9 33.2 2296 774.8 25.0 2255 150.4 18.8 2256 631.9 20.4 2363 2318 2258 2276 2269 9061.0 1039.8 911.2 348.3 168.8 736.4 673.0

	, , , ,	
TIME OF STUDY 09:59:25	FULLS SERV / NAV SEAS +10 DAYS / NO MAY PULSE	STUDY NO
21177711	VALUES IN 1000 AF EXCEPT AS INDICATED	2012

11ME OF S10D1 09.59.	2.5	LOTI	ANAC CL	/ INPAV S	VALUES			CEPT AS	INDICA	ATED				31
31MAR11 INI-SUM	30APR	2011 31MAY	30JUN	31JUL				15NOV			31DEC	31JAN	201 29FEB	.2
FORT PECK NAT INFLOW 9496 DEPLETION 240 EVAPORATION 338 MOD INFLOW 8918 RELEASE 9929 STOR CHANGE -1011 STORAGE 15803 ELEV FTMSL 2238.7 DISCH KCFS POWER 7.4	1022 -23 1045 476 569 16372 2241.2 8.0	1592 260 1332 922 410 16782 2243.0 15.0	2726 513 2213 833 1380 18162 2248.7 14.0	1208 204 23 981 1076 -95 18066 2248.4 17.5	424 -62 73 413 1107 -694 17372 2245.5 18.0	400 -129 91 438 1068 -629 16743 2242.8 17.9	77 474 1107 -633 16110	231 - 30 18 243 536 -293 15817 2238.8 18.0	108 -14 8 113 250 -137 15681 2238.1 18.0	270 -140 15540	395 -123 38 480 738 -258 15282 2236.3 12.0	374 -146 520 799 -279 15003 2235.0 13.0	432 -105 537 748 -211 14792 2234.0 13.0	
AVE POWER MW PEAK POW MW ENERGY GWH 1302.7	111 168 79.9	168 169 124.9	171 173 122.9	172 172 128.2	171 170 127.3	169 168 121.8	167 166 124.3	166 165 59.6	165 165 27.7	165 164 31.6	161 164 119.7	163 163 121.5	163 162 113.1	
GARRISON NAT INFLOW 13940 DEPLETION 988 CHAN STOR -53 EVAPORATION 385	1793 18 -6	1792 100 -68	4384 802 10	2562 621 -33 27	725 93 -5 84	542 -133 1 103	628 -1 87	239 -118 20	112 -55	127 -63 10 11	296 -117 49 44	313 -96 -10	427 -64	
REG INFLOW 22443 RELEASE 23378 STOR CHANGE -935	2245 1517 728 19777 1842.7 25.5			2958 2460 498 22406	1650 2460 -809 21597	1640 2467 -827 20770	1647 2552 -905 19865	872 1235 -362 19503	407 576 -169 19334	459 587 -128 19206	1156 1353 -197 19009			
AVE POWER MW PEAK POW MW ENERGY GWH 3491.0	323 495 232.3	489 498 363.5	500 503 360.2	503 504 374.3	503 502 374.1	501 500 360.7	499 498 371.2	491 484 176.6	483 482 81.1	454 481 87.1	278 479 206.9	351 473 261.0	348 468 242.0	
OAHE NAT INFLOW 2907 DEPLETION 632 CHAN STOR -18 EVAPORATION 373	837 49 -14	560 71 -52	752 145	266 173 26	78 116 81	133 28 -5 99	79 -10 0 84	40 1 20	19 0 9	21 1 18 10	12 59 42	14 18 -24	108 28	
REG INFLOW 25263 RELEASE 27517 STOR CHANGE -2255 STORAGE 21093	2292 1409 883 21976 1616.8 23.7	2897 2906 -9 21967 1616.8 47.3	2987 2731 256 22223 1617.5 45.9	2526 3288 -762 21461	2340 3129 -789 20672	2468 3291 -823 19849	2556 2908 -352 19497	1254 1390 -136 19361	682 -97 19264	615 887 -272 18992	1358 1722 -365 18628	1694 1672 22 18650 1606.9 27.2	1691 1502 189 18838 1607.5 26.1	
AVE POWER MW PEAK POW MW ENERGY GWH 4342.0	318 756 229.1	633 756 471.2	617 760 444.5	703 749 523.0	665 737 495.1	702 725 505.6	612 719 455.5	604 717 217.3	628 715 105.5	693 711 133.1	361 704 268.4	349 705 259.8	336 708 234.0	
DISCH KCFS 17.2 POWER	1409 1439 1621 1420.0 24.2	2906 2906 1621 1420.0 47.3	2731 2731 1621 1420.0 45.9	5 3284 3284 1621 1420.0 53.4	15 3115 3115 1621 1420.0 50.7	19 3272 3272 1621 1420.0 55.0	16 2892 2892 1621 1420.0 47.0	1386 1386 1621 1420.0 46.6	680 680 1621 1420.0 49.0	2 885 885 1621 1420.0 55.8	9 1714 1714 1621 1420.0 27.9	1672 1672 1621 1420.0 27.2	1502 1502 1621 1420.0 26.1	
AVÉ POWER MW PEAK POW MW ENERGY GWH 1544.3	110 486 79.5	202 440 150.2	196 440 141.2	236 464 175.6	237 509 176.1	260 517 187.0	228 538 169.4	230 538 82.7	241 538 40.6	274 538 52.5	139 538 103.6	133 538 98.9	125 529 87.0	
-FORT RANDALL- NAT INFLOW 968. DEPLETION 77 EVAPORATION 82 REG INFLOW 28288 RELEASE 28936 STOR CHANGE -648 STORAGE -648 STORAGE 3770 ELEV FIMSL 1357.7 DISCH KCFS 15.1	1665 1642 23 3793 1358.0 27.6	1362.0 44.6	2962 2962 4153 1362.0 49.8	57.3	3549 -422 3549 1355.2 57.7	57.7	3522 -643 2759 1345.0 57.3	57.3	796 -116 2322 1338.0 57.3	1337.5 57.3	1619 102 2398 1339.3 26.3	21.9	20.6	
AVE POWER MW PEAK POW MW ENERGY GWH 2352.3	238 365 171.1	361 375 268.6	375 375 270.0	374 370 278.1	362 354 269.7	352 349 253.1	335 317 249.0	305 294 110.0	289 285 48.6	284 283 54.5	192 293 142.8	166 319 123.3	163 339 113.6	
GAVINS POINT NAT INFLOW 1969 DEPLETION 115 CHAN STOR -13 EVAPORATION 24 REG INFLOW 30753 RELEASE 30765 STOR CHANGE -12 STORAGE 354 ELEV FTMSL 1206.5 DISCH KCFS 21.0	279 5 -24 1892 1904 -12 342 1206.0 32.0	260 19 -33 2951 2951 342 1206.0 48.0	285 24 -10 3213 3213 3213 342 1206.0 54.0	192 39 -14 2 3659 3659 342 1206.0 59.5	138 10 -1 55 3672 3659 13 355 1206.5 59.5	133 -5 0 6 3566 3541 25 380 1207.5 59.5	144 2 1 6 3659 3659 380 1207.5 59.5	71 5 0 1 1770 1770 380 1207.5 59.5	33 2 0 1 826 826 380 1207.5 59.5	38 3 0 1 944 944 380 1207.5 59.5	120 10 57 3 1783 1783 380 1207.5 29.0	120 1 8 1476 1476 380 1207.5 24.0	156 2 1343 1381 -38 342 1206.0 24.0	
POWER AVE POWER MW PEAK POW MW ENERGY GWH 849.3	106 114 76.3	112 112 83.5	111 111 79.9	110 110 81.7	111 112 82.4	113 115 81.6	115 115 85.2	115 115 41.2	115 115 19.2	115 115 22.0	101 117 75.3	84 117 62.7	83 114 58.1	
GAVINS POINT - SION NAT INFLOW 4014 DEPLETION 252 REGULATED FLOW AT SICKAF 34527 KCFS	1524 22	840 36	560 31 3742 62.9	350 39 3970 64.6	180 36 3803 61.8	132 24 3649 61.3	103 11 3751 61.0	50 6 1814 61.0	23 3 847 61.0	27 3 968 61.0	67 13 1837 29.9	48 14 1510 24.6	110 14 1477 25.7	
TOTAL NAT INFLOW 33294 DEPLETION 2304 CHAN STOR -81 EVAPORATION 1272 STORAGE 61720	. 5685 75 -43 63881	5250 495 -152 64728	8950 1527 0 68409	4658 1094 -47 89 67867	1592 208 -6 277 65166	1386 -208 -5 341 62765	1422 -85 0 289 60233	634 -135 0 67 59120	296 -63 0 31 58601	338 -72 27 35 58036	892 -202 168 143 57318	899 -206 -26 56888	1292 -124 2 56830	
SYSTEM POWER AVE POWER MW PEAK POW MW ENERGY GWH 13881.6 DAILY GWH	1206 2384 868.2 28.9	1965 2350 1461.9 47.2	1971 2361 1418.8 47.3	2098 2369 1561.1 50.4	2049 2385 1524.7 49.2	2097 2373 1509.8 50.3	1955 2352 1454.7 46.9	1910 2312 687.5 45.8	1921 2299 322.7 46.1	1984 2291 380.9 47.6	1232 2295 916.6 29.6	1246 2314 927.3 29.9	1218 2320 847.7 29.2	
INI-SUM		31MAY		31JUL			310CT		22NOV	30NOV		31JAN	29FEB	

Gavins Point Dam Release (million acre-feet)

* Actual	JAN 12 FEB 12	TOTAL	DEC	NOV	OCT	SEP	AUG	JUL	JUN	MAY	APR	MAR	FEB	JAN		
			2.287	4.165	4.197	3.894	3.959	3.782	3.569	3.664	2.993	2.191	1.685	1.553	67-10	MAX
		8.070	0.759	0.448	0.760	1.102	0.661	0.495	0.715	0.651	0.605	0.623	0.549	0.702	<u>67-10</u>	MIN
			1.154	1.834	2.106	2.112	2.129	1.983	1.771	1.730	1.477	1.206	0.966	1.051	67-10	MEAN
		21.681	1.549	2.749	3.000	2.805	2.581	2.152	1.649	1.550	0.912	0.922	0.834	0.978	YEAR	LAST
	1.230 1.150	20.69	1.383	2.082	2.152	2.083	2.041	1.943	1.880	1.888	1.598	1.389	1.111	1.138	FCST	Jan-11
* Actual	0.769 0.719	19.92	0.769	1.674	2.035	1.993	2.091	2.109	2.041	2.084	1.773	1.313	0.994	1.045	LD fest	Jan-11
*	1.476 1.343	30.56	1.722	3.333	3.443	3.332	3.443	3.443	3.094	2.890	1.904	1.389	1.277	1.291	UD fcst	Jan-11
** New Minimum	1.230 1.150	20.83	1.383	2.112	2.183	2.112	2.041	1.943	1.880	1.888	1.589	1.389	1.166	1.139	FCST	Feb-11
imum	0.769 0.719	19.97	0.769	1.674	2.035	1.993	2.091	2.109	2.041	2.084	1.773	1.313	0.944	1.139	LD fest	Feb-11
	1.476 1.381	30.62	1.722	3.362	3.474	3.362	3.474	3.474	3.094	2.890	1.904	1.389	1.333	1.139	UD fest	Feb-11
	1.230 1.150	20.91	1.353	2.142	2.214	2.142	2.041	1.943	1.880	1.888	1.589	1.433	1.147	* 1.139	FCST	Mar-11
	0.769 0.719	20.35	0.769	1.678	2.035	1.993	2.091	2.109	2.041	2.085	1.773	1.488	1.147	1.139	LD fest	Mar-11
	1.476 1.381	30.26	1.722	3.333	3.443	3.332	3.443	3.443	3.094	2.829	1.904	1.433	1.147 *	1.139 *	UD fest	Mar-11
	1.230 1.150	23.53	1.537	2.678	2.267	2.678	2.398	2.398	2.321	2.183	1.488	1.291	1.147	1.139	FCST	Apr-11
	1.045 0.978	20.14	1.045	1.678	2.035	1.993	2.091	2.109	2.041	2.084	1.488	1.291	1.147	1.139	LD fest	Apr-11
	1.476 1.381	31.49	1.783	3.540	3.659	3.541	3.659	3.659	3.213	2.951	1.904	1.291	1.147	1.139	UD fest	Apr-11
	JAN 12 FEB 12	TOTAL	DEC	NOV	OCT	SEP	AUG	JUL	JUN	MAY	APR	* MAR	* FEB	* JAN		

MAINSTEM ENERGY

(GWh)

	MAX	MEAN	MIN	AVG	LAST	Jan-11	Feb-11	Mar-11	Apr-11	
	67-10	<u>67-10</u>	<u>67-10</u>	100-YR	YEAR	FCST	FCST	FCST	FCST	
JAN	915	710	425	729	558	729	745 *	745 *	745 *	JAN
FEB	912	622	307	637	442	700	726	* 559	* 559	FEB
MAR	1,040	637	308	554	352	692	691	710	630 *	MAR
APR	1,252	681	251	711	384	751	751	787	209	APR
MAY	1,344	779	285	928	664	962	953	944	994	MAY
JUN	1,386	834	286	912	979	886	086	971	1128	NOI
JUL	1,484	944	289	1,023	816	1070	1062	1052	1211	luL
AUG	1,520	1,000	365	1,053	970	11114	1106	1096	1219	AUG
SEP	1,464	891	393	973	1094	666	1006	1013	1241	SEP
OCT	1,492	810	310	928	1081	826	837	852	1162	OCT
NOV	1,425	734	244	857	1001	820	830	844	1135	NOV
DEC	1,035	694	419	722	738	759	754	748	819	DEC
TOTAL	a	9;336		10,027	8,726	10,410	10,441	10,417	11,546	TOTAL
JAN 12						816	811	816	821	JAN 12
FEB 12						746	742	745	752	FEB 12
* A .4										

** New Minimum

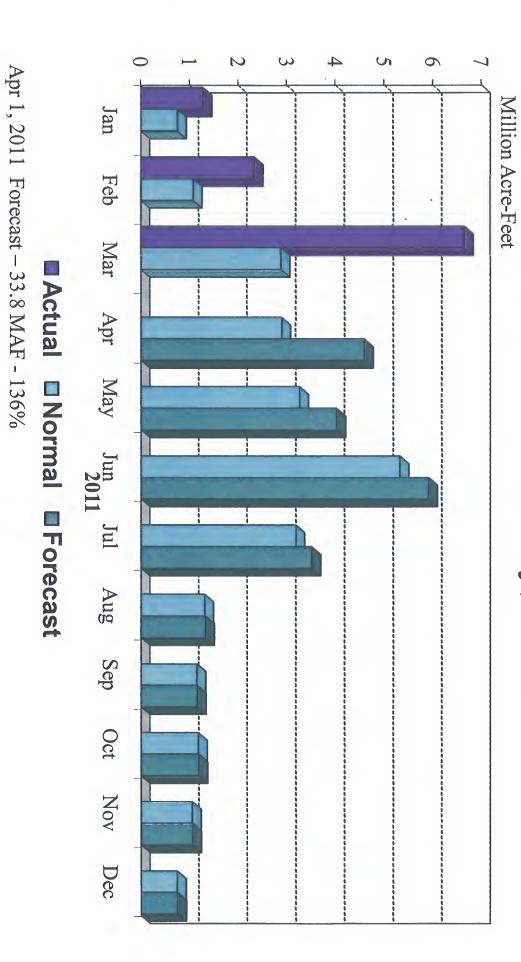
MAINSTEM ENERGY (GWh)

									* Actual
FEB 12	848	673	861	572	861	572	861	575	FEB 12
7 JAN 12	927	736	942	628	942	629	942		JAN 12
TOTAL	14,138 TOTAL	9,683	13,922	9,910	14,059	9,792	14017	9745	TOTAL
DEC	917	632	885	534	885	<u>534</u>	885	533	DEC
NOV	1391	668	1349	649	1361	650	1354	649	VOV
OCT	1455	775	1404	757	1414	757	1407	.756	OCT
SEP	1510	911	1468	904	1472	905	1465	904	SEP
AUG	1525	1028	1553	1034	1557	1038	1549	1036	AUG
JUL	1561	1040	1547	1046	1551	1050	1542	1049	JUL
JUN	1419	978	1390	986	1388	990	1386	988	NOL
MAY	1462	971	1351	990	1373	989	1369	988	MAY
APR	868	650	909	835	871	794	871	807	APR
* MAR	630 *	630 *	666	775	665	694	666	694	MAR
* FEB	655 *	655 *	655 *	655 *	777	646	748	642	FEB
* JAN	745 *	745 *	745 *	745 *	745 *	745 *	775	699	JAN
	Apr-11	Apr-11	Mar-11	Mar-11	Feb-11	Feb-11	Jan-11	Jan-11	
	FCST	FCST	FCST	FCST	FCST	FCST	FCST	FCST	
	Upper Basic	Lower Basic	Upper Basic	Lower Basic	Upper Basic	Lower Basic	Upper Basic	Lower Basic	

* Actual

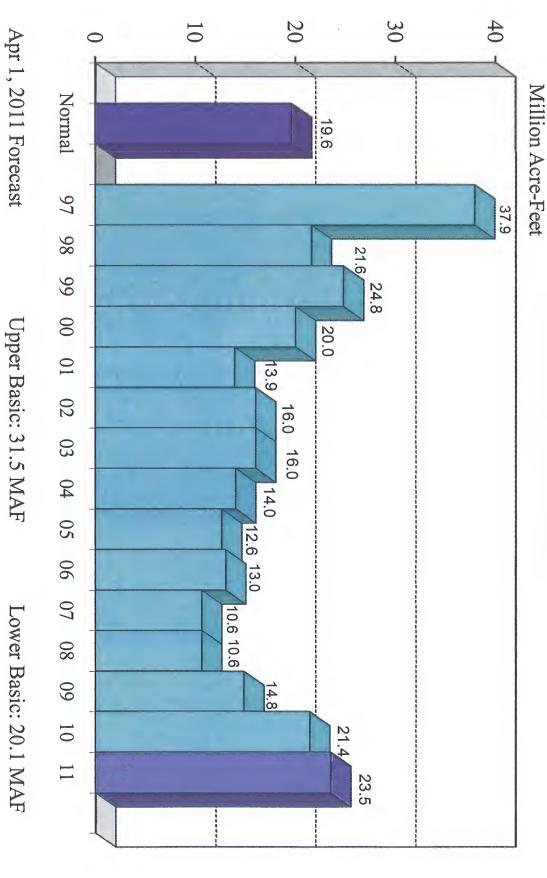
** New Minimum

CY 2011 Missouri River Runoff Above Sioux City, Iowa

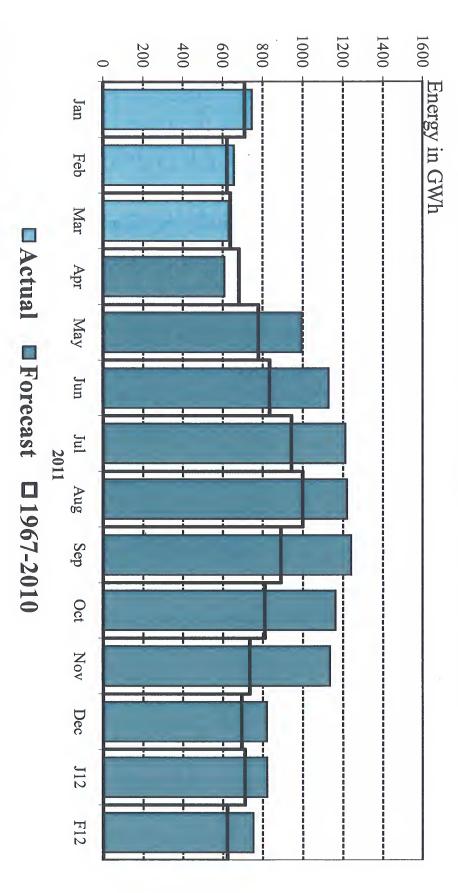


Normal: 24.8 MAF

Gavins Point Annual Release



Missouri River Mainstem System Forecasted Energy Generation



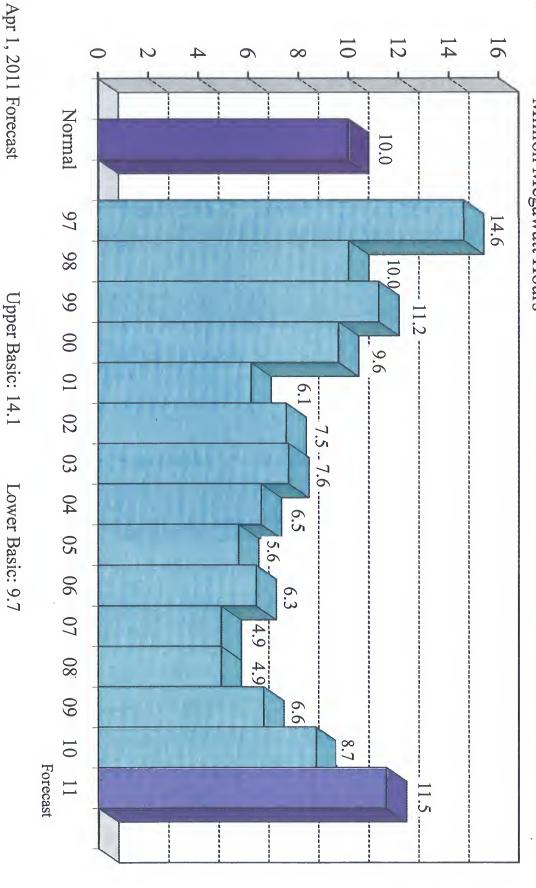
Upper Basic: 14,140 GWh

Basic: 11,550 GWh

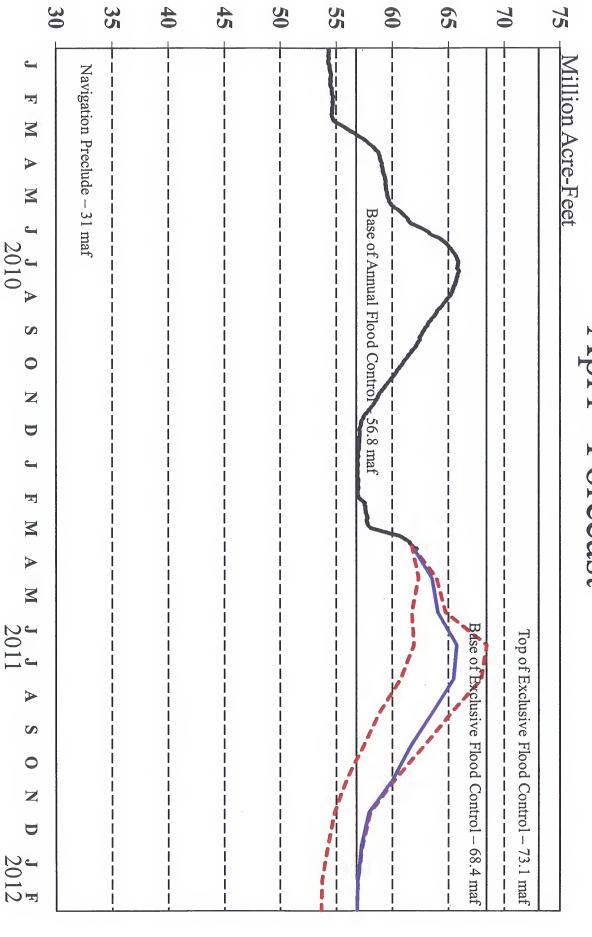
Lower Basic: 9,680 GWh

Mainstem System Generation





System Storage Aprlst Forecast



From: Sent: To: Monday, April 04, 2011 3:09 PM Farhat, Jody S NWD02;

NWO; C E NWO; NWO; NWO; NWD02; S NWO

NWD02; 3

NWO;

₩O:

NWD02; (

NWO; NWO; NWO; NWO; NWO; NWO; NWO; NWO;

NWO; Schenk, Kathryn M NWO; Away NWO; NWO; NWO; NWO; NWO;

NWO:

NWD02;

NWO;

NWO:

NWO;

NWD02

NWO;

NWO;

NWO:

NWO: I

NWO; NWO; NWO;

NWO; NWO; NWO; NWO

Final April 2011 Manthly Baseryain

Subject: Attachments: Final April 2011 Monthly Reservoir Studies (UNCLASSIFIED)

resfcastapr.pdf; Apr.2011-notes.docx; Runoff_Forecast_Apr2011.pdf

NWO:

Classification: UNCLASSIFIED

Caveats: NONE

All-

Enclosed are the Final April Monthly Reservoir Studies. No changes from the draft studies.

Thanks,

Hydraulic Engineer Missouri River Basin Water Management

Classification: UNCLASSIFIED

Caveats: NONE

AFR 1, 2011 / BASIC CONDITION / 33.8 MAF / BALANCED FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE Elevations & Storages are for Date Shown Avg Discharge & Energy are Monthly Values
Date of Study: April 1, 2011

						April 1,			_		0010	
	31-Mar-11	30-Apr	2011 31-May	30-Jun	31-Jul	'31-Aug	30-Sep	31-0ct	30-Nov	31-Dec	2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS		2239.7 7.0	2241.0 10.5	2243.9 11.0	2243.9 11.0	2242.0 11.0	2240.6 10.5	2239.3 10.0	2238.3 10.0	2236.8 12.0	2235.3 13.0	2234.0 13.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1843.7 15.0	1845.0 22.0	1848.0 29.0	1848.6 29.0	1846.6 29.0	1844.6 29.6	1842.2 30.5	1840.1 30.5	1839.7 19.0	1838.4 25.0	1837.5 25.0
OAHE ELEV FTMSL DISCH KCFS	1614.3 13.9	1616.0 15.9	1615.7 28.4	1615.7 34.2	1614.2 37.1	1612.1 38.0	1609.8 41.8	1609.1 33.4	1607.9 36.1	1606.7 24.9	1606.9 23.6	1607.5 22.7
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 16.4	1420.0 28.4	1420.0 34.2	1420.0 37.0	1420.0 37.6	1420.0 41.4	1420.0 33.1	1420.0 35.8	1420.0 24.7	1420.0 23.6	1420.0 22.7
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1357.0 20.9	1355.2 33.2	1355.2 36.5	1355.2 37.5	1355.2 37.6	1353.5 43.8	1345.0 43.2	1337.6 43.3	1339.4 23.0	1344.9 18.2	1350.1 17.0
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 25.0	1206.0 35.5	1206.0 39.0	1206.0 39.0	1206.5 39.0	1207.5 45.0	1207.5 4 5.0	1207.5 45.0	1207.5 25.0	1207.5 20.0	1206.0 20.0
SYSTEMSTORAGE 1000 AF ENERGY GWH PEAK POWER MW	61720 11089	63480 607 2389	63965 994 2397	65694 1128 2401	65376 1211 2394	63533 1219 2381	61633 1241 2370	59661 1162 2344	57931 1135 2293	57180 819 2293	56853 821 2314	56834 752 2320
						WER BASI NAV SEA				Q (CATC)		
	31-Mar-11	30-Apr	2011		,						2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS	2238.7 7.4	2238.6	2238.0 11.0	2238.8	2237.7	2235.9	223 4 .9 7.5	2234.5 6.0	2233.9	2232.6	2230.9 11.0	2229.4 11.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1842.0 15.0	1842.4 19.5	1843.9 22.0	1843.4 22.0	1841.7 22.0	1840.5 19.3	1839.4 16.5	1838.6 16.5	1837.2 19.0	1835.2 24.0	1833.7 24.0
OAHEELEV FTMSL DISCH KCFS	1614.3 13.9	1614.9 18.6	1613.6 28.9	1612.3 31.6	1609.9 33.7	1607.0 33.6	1604.5 30.8	1603.1 22.1	1602.3 19.5	1602.3 17.9	1602.8 21.1	1603.6 20.4
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 19.1	1420.0 28.9	1420.0 31.6	1420.0 33.6	1420.0 33.2	1420.0 30.3	1420.0 21.7	1420.0 19.1	1420.0 17.6	1420.0 21.1	1420.0 20.4
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1357.0 22.4	1355.2 32.7	1355.2 32.9	1355.2 33.7	1355.2 33.0	1353.5 32.5	1345.0 31.7	1337.5 26.5	1339.3 15.9	1344.8 15.7	1350.0 14.5
GAVINS POINT ELEV FTMSL DISCH KCFS		1206.0 25.0	1206.0 33.9	1206.0 34.3	1206.0 34.3	1206.5 34.0	1207.5 33.5	1207.5 33.1	1207.5 28.2	1207.5 17.0	1207.5 17.0	1206.0 17.0
STORAGE 1000 AF ENERGY GWh PEAK POWER MW	61720	62283 650 2369	61714 971 2376	61908 978 2377	60676 1040 2363	58846 1028 2332	57374 911 2318	55871 775 2296	54809 668 2255	54167 632 2256	53719 736 2276	53568 673 2282
						PER BASI SEAS +10						
	31-Mar-11	30-Apr	2011				•			31-Dec	2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS		22 41 .2 8.0	2243.0 15.0	2248.7 14.0	2248.4 17.5	2245.5 18.0	2242.8 17.9	2240.1 18.0	2237.5 17.7	2236.3 12.0	2235.0 13.0	2234.0 13.0
GARRISON ELEV FTMSL DISCH KCFS		1842.7 25.5	1843.0 40.0	1848.8 40.0	1850.2 40.0	1848.0 40.0	1845.6 41.5	1843.0 41.5	1841.0 40.3	1840.4 22.0	1838.7 28.0	1837.5 28.0
OAHEELEV FTMSL DISCH KCFS		1616.8 23.7	1616.8 47.3	1617.5 45.9	1615.4 53.5	1613.1 50.9	1610.7 55.3	1609.6 47.3	1608.0 49.7	1606.8 28.0	1606.9 27.2	1607.5 26.1
BIG BEND ELEV FTMSL DISCH KCFS		1420.0 24.2	1420.0 47.3	1420.0 45.9	1420.0 53.4	1420.0 50.7	1420.0 55.0	1420.0 47.0	1420.0 49.6	1420.0 27.9	1420.0 27.2	1420.0 26.1
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1358.0 27.6	1362.0 44.6	1362.0 49.8	1360.0 57.3	1355.2 57.7	1353.5 57.7	1345.0 57.3	1337.5 57.3	1339.3 26.3	1344.8 21.9	1350.0 20.6
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 32.0	1206.0 48.0	1206.0 54.0	1206.0 59.5	1206.5 59.5	1207.5 59.5	1207.5 59.5	1207.5 59.5	1207.5 29.0	1207.5 24.0	1206.0 24.0
SYSTEMSTORAGE 1000 AF ENERGY GWH PEAK POWER MW	61720 13882	63881 868 2384	64728 1462 2350	68409 1419 2361	67867 1561 2369	65166 1525 2385	62765 1510 2373	60233 1455 2352	58036 1391 2291	57318 917 2295	56888 927 2314	56830 848 2320

4 PAGE

TIME OF STUDY 15:01:38 FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE VALUES IN 1000 AF EXCEPT AS INDICATED AR11 2011 INI-SUM 30APR 31MAY 31MAR11 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB --FORT PECK--NAT INFLOW DEPLETION 234 30 674 676 -2 16991 2243.9 11.0 -75 117 291 623 -332 16230 2240.6 10.5 -42 101 326 615 -289 15941 2239.3 10.0 -132 51 410 738 -328 15393 -19 21 88 139 -22 24 100 159 492 483 11 94 298 525 -41 -153 -118 187 298 -110 15831 **EVAPORATION** 417 226 16029 2239.7 7.0 799 -334 15059 2235.3 13.0 655 671 16993 2243.9 11.0 676 -429 16562 2242.0 11.0 748 -270 14789 646 MOD INFLOW RELEASE 7188 STOR CHANGE STORAGE -1014 15803 2238.7 7.4 16322 2241.0 10.5 -51 15 780 -59 15721 ELEV FTMSL DISCH KCFS 2238.8 2238.6 2238.3 2236.8 POWER AVE POWER MW PEAK POW MW ENERGY GWH 166 69.8 167 107.8 169 114.0 168 113.6 166 103.0 166 49.7 166 23.2 165 26.5 164 120.1 169 109.7 163 104.4 1176.6 -GARRISON NAT INFLOW DEPLETION CHAN STOR 177 -34 291 6 765 -5 -25 5 602 107 -142 5 -56 -115 -20 57 1023 -55 $-\bar{1}\bar{2}\bar{1}$ -57 -3 4 - 65 0 -87 -10 1064 1783 -719 21110 1846.6 29.0 1087 1760 -673 20437 1053 1875 -823 19615 1842.2 30.5 16195 17131 -937 19049 1840.5 567 907 265 1986 3 03 EVA PORATION 17 90 13 53 4 37 205 52 1845 • 0 REG INFLOW RELEASE 1 958 202 21830 1848.6 29.0 -145 18789 1839.7 19.0 1066 20115 1843.7 1075 21627 1848.0 -159 19115 1840.7 RELEASE
STOR CHANGE
STORAGE
ELEV FIMSL
DISCH KCFS
POWER
AVE POWER MW
PEAK POW MW -341 19274 1841.2 30.5 -181 18934 1840.1 -400 18389 1844.6 1838.4 25.0 21.8 15.0 22.0 29.0 29.6 30.5 30.5 502 270.5 502 282.2 501 499 274.6 38 9 48 8 480 478 73.7 476 178.2 232.6 138.8 216.2 ENERGY GWH 2649.4 137.6 210.3 281.1 289.1 64.6 OAHE-632 -10 534 18061 20317 -10 -4 110 1837 2056 -219 19340 0 0 23 416 NAT INFLOW DEPLETION CHAN STOR EVAPORATION 71 -25 145 -25 28 -2 18 -24 173 28 45 56 1146 1531 -385 18588 1606.7 24.9 25 1626 2335 -708 20335 1612.1 38.0 1761 2279 -518 21043 1614.2 37.1 -2 129 1712 2487 -776 19559 890 475 2033 -18 21561 1615.7 34.2 1745 944 575 21668 REG INFLOW RELEASE 4 75 670 -195 18973 1607.9 42.2 -95 1 9245 -77 19168 57 18645 1606.9 RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS POWER -89 21579 1615.7 28.4 -2256 21093 1614.3 1616.0 15.9 1609.8 41.8 1609.1 1608.6 35.5 1608.8 AVE POWER MW PEAK POW MW ENERGY GWH 750 329.7 743 367.9 732 373.4 716 323.2 710 104.3 704 238.7 713 720 715 705 3228.9 153.5 283.8 393.0 154.6 225.6 204.0 -BTG BEND 2315 2315 1621 1420.0 37.6 24 63 24 63 1621 420.0 2273 1621 1420.0 37.0 976 976 1621 20.0 EVA PORATION 2035 2035 6 64 6 64 1520 1520 1621 974 1621 1420.0 16.4 2033 1621 420.0 34.2 488 20244 1745 1621 1420.0 REG INFLOW RELEASE 1420.0 41.9 STORAGE ELEV FTMSL DISCH KCFS 1420.5 17.2 420.0 33.1 20.0 1420.0 420.0 32.8 35.2 24.7 28.4 41.4 POWER AVE POWER MW PEAK POW MW ENERGY GWH 509 115.1 509 128.7 509 131.0 517 141.0 538 120.0 538 58.7 538 29.4 538 538 92.0 538 85.9 528 75.8 1.33 98.8 39.8 1170.6 54.4 -FORT RANDALL-NAT INFLOW DEPLETION EVAPORATION 3 10 1521 1414 107 2408 339.4 23.0 77 117 12 18 15 25 0 4 2014 2656 -642 2764 1345.0 43.2 2173 0 3549 355.2 36.5 24 62 2607 -145 3405 1353.5 43.8 1122 350 2758 REG INFLOW RELEASE 21426 1242 2039 -156 3549 2304 2313 1289 -320 2443 601 687 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -638 3770 1357.7 15.1 -65 3705 1357.0 20.9 355.2 37.5 -27 2301 1337.6 43.3 -116 2327 1355.2 37.6 1355.2 40.1 1338.1 44.9 18.2 POWER AVE POWER MW PEAK POW MW ENERGY GWH 362 2046.8 129.4 356 220.6 356 233.8 356 234.7 319 240.6 30<u>1</u> 297 108.2 288 48.3 319 103.0 356 208.9 350 245.4 339 94.4 --GAVINS POINT-NAT INFLOW DEPLETION 3 0 2 24 -6 39 -2 2 50 7 2 0 2 625 625 10 38 25<u>0</u> 19 10 -5 115 -5 -12 9 27 03 26 78 25 380 207 .5 45 .0 2398 13 355 1206.5 39.0 CHAN STOR EVAPORATION -11 -24 1537 2767 2767 22827 -12 354 1206.5 21.0 2398 REG INFLOW
RELEASE
STOR CHANGE
STORAGE
ELEV FIMSL
DISCH KCFS
POWER 2183 2321 714 -38 342 1206.0 -12 342 1206.0 1206.0 35.5 1206.0 39.0 1206.0 39.0 1207.5 45.0 1207.5 45.0 1207.5 45.0 1207.5 45.0 1207.5 25.0 1207.5 20.0 25.0 20.0 AVE POWER MW PEAK POW MW ENERGY GWH 117 65.3 114 114 48.7 114 116 116 86.2 116 41.7 116 19.5 116 22.3 117 52.5 $\begin{array}{c} 114 \\ 114 \end{array}$ $\frac{114}{114}$ $\frac{114}{115}$ 817.0 61.9 84.0 82.1 84.8 85.1 82.9 -GAVINS POINT - SIOUX CITY --CAVINS FOUNT - SIOUX CITY-NAT INFLOW 3196 1279 DEPLETION 252 22 REGULATED FLOW AT SIOUX CITY-KAF 25771 2745 KCFS 46.1 31 39 36 6 3 3 24 11 13 14 14 25.7 46.2 46.2 20.4 21.4 27 64 KCFS 44.4 40.9 46.4 46.2 46.2 --TOTAL--NAT INFLOW DEPLETION CHAN STOR EVAPORATION -79 -1 88 -209 65 189 -2 115 65376 0 361 63533 -149 0 168 58795 -68 1825 -69 0 78 -204 -25 18 -83 -36 -163 -9 -63 -130 EVAPORATION
STORAGE
SYSTEM POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH
DAILY GWH 5 6853 63 480 2389 606.6 20.2 2397 993.7 32.1 2401 1127.7 37.6 2394 1211.3 39.1 2370 1241.3 41.4 2344 1162.0 37.5 2293 320.8 40.1 2314 821.3 2301 2320 2381 2312 2293 11089.3 1218.9 551.8 262.1 37.4 819.4 26.4 752.2 25.9 26.5 INI-SUM 30 APR 31MAY 30JUN 31JUL 31AUG 30SEP 310CT 15NOV 22 NOV 30NOV 31DEC 31JAN 29 FEB

DATE OF STUDY	04/01/1	11	AF	PR 1, 20	011 / L	OWER BAS	IC / 25	.7 MAF	/ BALAN	ICED			99001	9901	9901 PAGE	1
TIME OF STUDY		52	FULL S	SERV / S	VAN NTH	/ SEAS 0 VALUES	DAYS / IN 100	PULSE	MAY 16. CEPT AS	9 (CALC S INDICA	C) ATED				STUDY NO	8
31MF	AR11 INI-SUM		2011			31 AUG						31DEC	31JAN	20 29 FEB	12	
FORT PECK- NAT INFLOW DEPLETION EVAPORATION MOD INFLOW RELEASE STOR CHANGE STORAGE ELEV FIMSL DISCH KCFS	4814 408 568 3838 5786 -1948 15803		742 195 547 676 -129 15653 2238.0 11.0	1111 405 706 536 170 15824 2238.8 9.0	563 219 35 309 553 -245 15579 22 37.7 9.0	282 1 110 171 553 -382 15197 2235.9 9.0	266 -108 137 237 446 -209 14988 2234.9 7.5	308 -90 119 279 369 -90 14899 2234.5 6.0		72 -11 25 58 83 -25 14819 2234.1 6.0		263 -80 61 282 553 -272 14502 2232.6 9.0		288 -55 343 633 -290 13855 222 9.4 11.0		
POWER AVE POWER MV PEAK POW MW ENERGY GWH	952.7	97 166 69.7	150 165 111.6	124 166 89.5	124 165 92.4	124 164 92.0	103 163 73.9	82 163 61.1	82 162 29.5	162 13.8	95 162 18.3	122 161 91.0	146 160 108.8	145 159 101.2		
GARRISON- NAT INFLOW DEPLETION CHAN STOR EVAPORATION REG INFLOW RELEASE	7002 901 -36 660 11191 13274	998 21 4 1397 893	813 111 -39 1340 1199	1750 524 19 1781 1309	1168 493 41 1187 1353	483 111 129 796 1353	362 -107 15 160 770 1147	418 20 15 137 644 1015	159 -93 61 369 491	74 -43 28 172 229	85 -50 -10 32 203 262	198 -52 -20 69 714 1168	209 -22 -20 888 1476	285 -12 930 1381		
STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS POWER	-2083 19049	505 19554	$140 \\ 19694$	472 20166	-166 20000	-557 19444 1841.7 22.0	-3 <i>77</i> 190 <i>6</i> 7	-370 18696	-122 18575	-57 18 518	-59 18459	-454 18005	-588 17417	-451 16966		
AVE POWER MV PEAK POW MW ENERGY GWH	2020.0	190 485 137.0	248 491 184.5	281 499 202.2	282 498 209.5	280 483 208.3	244 479 175.6	208 475 155.1	207 474 74.7	207 473 34.8	207 472 39.7	237 467 176.1	295 460 219.5	292 454 203.1		
OAHE NAT INFLOW DEPLETION CHAN STOR EVAPORATION	1380 632 -10 620	423 49 25	240 71 -16	27 6 14 5 - 9	111 173 41	52 116 124	89 28 11 150	53 -10 11 127	27 1 57	13 0 26	14 1 30	12 -10 65	10 18 -21	72 28		
REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS POWER	13393 16824 -3431 21093 1614.3 13.9	1292 1105 186 21279 1614.9 18.6	1352 1776 -425 20854 1613.6 28.9	1431 1879 -449 20406 1612.3 31.6	1250 2072 -822 19584 1609.9 33.7	1165 2068 -903 18681 1607.0 33.6	10 69 18 35 -7 66 17915 1604 .5 30 .8	962 1361 -399 17516	460 589 -128 17388 1602.7 19.8	215 310 -95 17293 1602.4 22.3	246 258 -13 17280 1602.3 16.3	1081 1099 -19 17261 1602.3 17.9	1447 1299 148 17409 1602.8 21.1	1425 1172 253 17662 1603.6 20.4		
AVE POWER MV PEAK POW MW ENERGY GWH	2629.8	249 746 179.2	385 740 286.5	418 733 301.0	441 720 328.4	435 705 323.4	393 692 283.1	280 685 208.4	249 682 89.7	280 681 47.1	205 680 39.3	225 680 167.2	266 683 197.5	257 687 178.9		
BIG BEND- EVAPORATION REG INFLOW RELEASE STORAGE ELEV FTMSL DISCH KCFS POWER AVE POWER MV PEAK POW MW	129 16695 16725 1651 1420.5 17.2	1105 1135 1621 1420.0 19.1 88 495	1776 1776 1621 1420.0 28.9	1879 1879 1621 1420.0 31.6	8 2064 2064 1621 1420.0 33.6 157 509	24 2044 2044 1621 1420.0 33.2 156 509	31 1804 1804 1621 1420.0 30.3	27 1334 1334 1621 1420.0 21.7	12 576 576 1621 1420.0 19.4 97 538	6 304 304 1621 1420.0 21.9	7 252 252 1621 1420.0 15.9 80 538	14 1085 1085 1621 1420.0 17.6	1299 1299 1621 1420.0 21.1 104 538	1172 1172 1621 1420.0 20.4 98 529		
ENERGY GWHFORT RANDAI NAT INFLOW	487	63.4 135	100.6	106.4	116.9	115.7 31	103.4	79.1	35.0	18.5	15.4	66.1	77.1	68.0		
DEPLETION EVAPORATION REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS	77 146 16988 17637 -649 3770 1357.7	1266 1331 -65 3705 1357.0 22.4	9 1855 2011 -156 3549 1355.2 32.7	12 1958 1958 3549 1355.2 32.9	18 10 2070 2070 0 3549 1355.2 33.7	15 32 2028 2028 0 3549 1355.2 33.0	7 39 1788 1934 -146 3402 1353.5 32.5	31 1306 1949 -643 2759 1345.0 31.7	1 12 565 887 -322 2437 1340.0 29.8	0 5 300 416 -116 2321 1337.9 30.0	1 248 274 -26 2295 1337.5 17.3	3 12 1080 978 102 2397 1339.3 15.9	1316 966 350 2747 1344.8 15.7	1208 834 374 3121 1350.0 14.5		
POWER AVE POWER MV PEAK POW MW ENERGY GWH	1742.5	193 362 138.6	277 356 206.1	277 356 199.2	283 356 210.4	277 356 206.3	271 350 195.4	25 4 31 9 188.7	225 296 81.0	219 287 36.8	126 285 24.1	117 293 86.8	119 319 88.7	115 339 80.3		4 88 70
GAVINS POIN NAT INFLOW DEPLETION CHAN STOR EVA PORATION REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS	1099 115 0 45 18577 18589 -12 354	163 -14 1476 1488 -12 342 1206.0 25.0	112 19 -20 2084 2084 342 1206.0 33.9	107 24 0 2041 2041 342 1206.0 34.3	82 39 -1 3 2109 2109 2109 342 1206.0 34.3	92 10 1 8 2104 2091 13 355 1206.5 34.0	89 -5 1 11 2018 1993 380 1207.5 33.5	96 2 1 10 2035 2035 380 1207.5 33.1	47 5 3 4 928 928 928 380 1207.5 31.2	22 2 0 2 433 433 380 1207.5 31.2	25 3 24 2 3 17 3 17 3 80 1207.5 20.0	80 10 3 5 1045 1045 380 1207.5 17.0	80 1 0 1045 1045 380 1207.5 17.0	104 2 940 978 -38 342 1206.0		
POWER MV AVE POWER MV PEAK POW MW ENERGY GWH		86 114 61.9	110 114 81.6	111 114 79.6	111 114 82.2	110 115 82.1	111 117 79.8	111 117 82.5	107 117 38.3	107 117 17.9	71 117 13.5	60 117 44.7	60 117 44.7	60 114 41.5		
GAVINS POIN NAT INFLOW DEPLETION REGULATED FLO KAF KCFS	2104 252	831 22	4 20 36	210 31 2220 37.3	150 39 2220 36.1	120 36 2175 35.4	87 24 2056 34.6	69 11 2093 34.0	33 6 955 32.1	15 3 446 32.1	18 3 332 20.9	45 13 1077 17.5	32 14 1063 17.3	74 14 1038 18.0		
-TOTAL NAT INFLOW DEPLETION CHAN STOR EVAPORATION STORAGE SYSTEM POWER AVE POWER MY		2 984 139 15 62 283 903	24 15 4 41 -75 617 14 1305	3545 1141 10 61908 1358	2108 981 -1 138 60676	1060 289 1 427 58846 1382	923 -161 26 527 57374 1266	94 8 -66 28 45 1 5587 1	422 -104 3 200 55245	197 -49 0 92 54 952 1 005	225 -55 14 105 54809	596 -94 -28 227 54167	601 -55 -41 53719	862 -22 2 53568 967		
PEAK POW MW ENERGY GWH DAILY GWH	9061.0 INI-SUM	2369 649.8 21.7	2376 970.9 31.3	2377 977.8 32.6	2363 1039.8 33.5	2332	23 18 911 . 2 30 . 4	2296 774.8 25.0	2269 348.3 23.2 15NOV	2258 168.8 24.1	2255 150.4 18.8 30NOV	2256 631.9 20.4	2276 736.4 23.8 31JAN	2282 673.0 23.2		

STUDY	NTO	
SIUDI	NO	

FULLS SERV / NAV SEAS +10 DAYS / NO MAY PULSE VALUES IN 1000 AF EXCEPT AS INDICATED TIME OF STUDY 09:59:25 MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB 31MAR11 INI-SUM 30APR 31MAY -FORT PECK---62 73 413 1107 -694 17372 2245.5 18.0 -89 77 474 1107 -633 16110 2240.1 18.0 -30 18 243 536 -293 15817 2238.8 18.0 -14 8 113 250 -137 15681 -16 9 130 270 -140 15540 2237.5 17.0 204 23 981 NAT INFLOW DEPLETION -23 260 513 -146 -105 240 338 8918 9929 -1011 15803 2238.7 7.4 -123 38 480 738 -258 15282 -129 91 438 EVAPORATION MOD INFLOW 799 -279 15003 2235.0 13.0 833 1380 18162 2248.7 14.0 748 -211 14792 922 410 476 569 16372 2241.2 8.0 -95 18066 2248.4 17.5 -629 16743 2242.8 17.9 RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS 2243.0 15.0 2238.1 18.0 2236.3 POWER AVE POWER MW
PEAK POW MW
ENERGY GWH 166 124.3 165 59.6 79.9 124.9 122.9 128.2 127.3 121.8 27.7 119.7 121.5 113.1 1302.7 31.6 -GARRISON-NAT INFLOW DEPLETION CHAN STOR 988 -53 385 802 10 18 -6 621 -33 27 93 -5 -117 49 44 -96 -10 -133 -118 -55 -64 -63 10 11 -68 -1 87 1640 2467 -827 20770 1845.6 41.5 872 1235 -362 19503 1841.9 41.5 407 576 -169 19334 1841.4 41.5 EVAPORATION REG INFLOW RELEASE 23378 -935 19049 1840.5 21.8 1517 728 2380 2045 2460 498 2552 -905 1353 -197 1722 -523 2460 2460 587 -372 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -809 -128 1842.7 25.5 1843.0 40.0 .848.8 40.0 850.2 40.0 1848.0 40.0 1843.0 41.5 .841.0 .37.0 1840.4 22.0 838.7 28.0 28.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 498 363.5 503 360.2 504 374.3 502 374.1 500 360.7 498 371.2 484 176.6 482 81.1 481 87.1 479 206.9 473 261.0 232.3 242.0 3491.0 28 -5 99 2468 3291 -823 19849 1610.7 55.3 -10 0 84 2556 2908 -352 19497 1609.6 47.3 NAT INFLOW DEPLETION CHAN STOR EVAPORATION 18 -24 71 -52 173 145 59 42 1358 1722 -365 18628 632 -18 373 25263 27517 -2255 21093 1614.3 13.9 18 10 615 887 -14 ō 2526 3288 -762 21461 615.4 53.5 2340 3129 -789 20672 1613.1 50.9 1254 1390 -136 19361 1609.2 46.7 585 682 -97 19264 1608.9 1409 883 21976 1616.8 23.7 2731 256 22223 1617.5 45.9 1672 22 18650 1502 189 18838 2906 REG INFLOW REG INFLOW
RELEASE
STOR CHANGE
STORAGE
ELEV FTMSL
DISCH KCFS
POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH -272 18992 1608.0 -9 21967 1616.8 47.3 1606.8 1606.9 27.2 49.1 55.9 28.0 26.1 725 505.6 719 455.5 715 105.5 756 229.1 756 471.2 737 495.1 717 217.3 760 711 523.0 4342.0 133.1 268.4 259.8 234 0 -BIG BEND-3115 3115 1621 420.0 50.7 27447 27477 1651 1420.5 17.2 3272 3272 1621 20.0 55.0 2892 2892 1621 420.0 47.0 1714 1621 1420.0 27.9 EVAPORATION REG INFLOW RELEASE 1439 1621 1420.0 24.2 1386 1621 420.0 46.6 885 1621 1420.0 55.8 1672 1621 1420.0 27.2 2906 1621 1420.0 47.3 2731 1621 1420.0 45.9 3284 1621 680 1621 120.0 49.0 1502 1621 RELEASE STORAGE ELEV FTMSL DISCH KCFS POWER AVE POWER MW PEAK POW MW ENERGY GWH 20.0 1420.0 509 176.1 440 141.2 517 187.0 538 169.4 79.5 150.2 175.6 82.7 52.5 98.9 87.0 1544.3 103.6 -FORT RANDALL----FORT RANDAI NAT INFLOW DEPLETION EVAPORATION REG INFLOW RELEASE STOR CHANGE STORAGE 15 19 3127 3549 -422 3549 1355.2 57.7 4 9 12 18 3 3 18 3521 -182 3971 3522 -643 2759 1642 23 3793 2743 360 4153 3434 -146 3403 1706 -321 2438 796 -116 2322 1619 102 2398 28936 -648 3770 1357.7 15.1 -26 2296 350 2748 374 3122 STORAGE
ELEV FTMSL
DISCH KCFS
POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH 1344.8 1358.0 27.6 1362.0 1362.0 1360.0 57.3 353.5 1345.0 57.3 1340.0 1338.0 1337.5 1339.3 365 171.1 375 270.0 317 249.0 375 268.6 349 253.1 319 123.3 278.1 269.7 110.0 48.6 54.5 142.8 2352.3 -GAVINS POINT-NAT INFLOW DEPLETION 5 0 39 -14 -13 -33 -10-1 -5 0 0 1 57 -24 1 8 CHAN STOR EVAPORATION REG INFLOW RELEASE 30765 -12 354 1206.5 21.0 3659 13 3659 3659 1904 -12 342 1206.0 32.0 3541 25 2951 3213 3659 1770 826 944 1783 1476 1381 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -38 342 207.5 59.5 1206.0 48.0 1206.0 54.0 1206.0 59.5 355 206.5 59.5 1207.5 59.5 1207.5 59.5 1207.5 59.5 1207.5 59.5 1207.5 29.0 1207.5 24.0 24.0 POWER MW PEAK POW MW ENERGY GWH 115 19.2 115 22.0 117 75.3 117 62.7 112 83.5 110 81.7 115 85.2 115 41.2 76.3 79.9 $1\overline{12}$ 82.4 81.6 849.3 58.1 - SIOUX CITY-4014 1524 252 22 AT SIOUX CITY 34527 3406 57.2 --GAVINS POINT NAT INFLOW DEPLETION REGULATED FLOW KAF KCFS 11 6 14 31 39 24 13 14 61.1 62.9 61.0 29.9 24.6 25.7 61.0 61.0 64.6 61.8 61.3 61.0 --TOTAL--NAT INFLOW DEPLETION CHAN STOR EVAPORATION 2304 -81 1272 61720 -202 168 143 57318 1094 -47 -85 0 -135 0 -63 0 -72 27 35 1527 -124 -43 -152 -208 -206 -26 Ó 65166 62765 60233 59120 STORAGE STORAGE SYSTEM POWER AVE POWER MW PEAK POW MW ENERGY GWH 2384 868.2 28.9 2350 1461.9 47.2 2361 1418.8 2369 1561.1 2385 1524.7 2352 1454.7 2312 687.5 2299 322.7 2291 380.9 2295 916.6 29.6 2373 2314 927.3 2320 13881.6 1509.8 847.7 45.8 DAILY GWH 47.3 50.4 49.2 50.3 46.9 46.1 47.6 29.9 29.2 22NOV 31DEC INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 310CT 15NOV 30NOV 31JAN 29FEB

April 4th, 2011 Reservoir Monthly Study Call

General Conditions:

1. Past Runoff

Last month's runoff was 231% of normal.

Ranging from about 385% in the Sioux City reach to 156% in the Garrison reach. Due to continued plains snow melt runoff and wet soil conditions.

Total system storage on March 31st – 61.7 MAF

2. Current Mountain Snow Pack (May thru July runoff)

116% of normal – above Ft. Peck

112% of normal – between Ft. Peck and Garrison

114% of normal – total above Garrison

Normally, 96 percent of the peak accumulation has occurred by April 1.

Current Plains Snow Pack (March and April Runoff).

Fort Peck reach – light snowpack (0"- 2" SWE) in central Montana. Trace amounts to the south of the reservoir.

Garrison reach – light to moderate snowpack (2"-4.5" SWE). Primarily in the Milk River and North Central North Dakota (north of the Missouri River).

Oahe reach – Some snow left in North Dakota primarily in and around the Knife River area.

Big Bend, Fort Randall, and Gavins Point reaches – No remaining snowpack.

Gavins to Sioux City Reach – light to moderate snowpack $(2.5"-4" \ SWE)$ - North of a line from Aberdeen to Watertown, SD.

3. Forecasted Annual Runoff

For April thru June - Higher probability of above normal precipitation in North Dakota and northeast Montana. Normal hydrologic conditions in the Dakotas, Wyoming, Montana, and Iowa through June. Moderate drought will continue to develop in southern Nebraska and central Kansas. Moderate to severe drought in eastern Colorado and western Kansas.

Basic – 33.8 MAF (136% of Normal)

UB - 43.0 MAF

LB - 25.7 MAF

4. Gavins Releases

March - 21.0 kcfs.

Currently 21.0 kcfs. Will likely continue to release 21.0 kcfs through mid April when flows will be increased due to the service level increase and the start of the evacuation of stored flood water.

Monthly Studies

1. Next Water-Year Balancing – Will be 100% full at Feb 2012 – Basic and upper simulation.

The 3 reservoirs will be below the base of flood control by the end of Feb 2012 for lower basic.

Will be balanced for all 3 conditions.

2. Navigation Service Levels

Basic – Full service levels likely going to flood water evacuation flows.

Lower Basic – Full service for entire season.

Upper Basic – Flood control releases all year (including spillway releases.)

3. Navigation Season Lengths

0 Days shortening for lower basic.

10 Day extension for basic and upper basic

4. Spring Pulses

March – Cancelled due to high James River flows and flow limits being exceeded downstream. May – Likely cancelled due to service level increase for both the Basic and Upper Basic Conditions

5. Energy Generation

Last month – 630 MkWhrs actual – long-term average for March 554 MkWhrs This year forecast – Basic Simulation – 11.5 BKWhrs. Long-term average approx 10.0 BKWhrs

6. Spring Forage Fish Spawn

Will "favor" Garrison this year if there's not enough water to keep all 3 reservoirs rising All three reservoirs rise during period for Basic, Lower Basic, and Upper Basic.

									·
Reach Above	Fort Peck	Garrison	Oahe	Fort Randall	Gavins Point	Sioux City	Summation above Gavins	Summation above Sioux	Accumulated Summation above
				Values in 10	00 Acre Feet		Point	City	Sioux City
	(History)			value in xo	00 11010 1 001				
JAN 2011	431	299	120	86	67	273	1,003	1,276	1,276
NORMAL	312	261	12	25	100	40	710	750	750
DEPARTURE	119	38	108	61	-33	233	293	526	526
% OF NORM	138%	115%	998%	346%	67%	682%	141%	170%	170%
FEB 2011	580	457	318	217	236	524	1,808	2,333	3,609
NORMAL	360	356	90	49 .	130	92	985	1,077	1,827
DEPARTURE	220	101	228	168	106	432	823	1,256	1,782
% OF NORM	161%	128%	354%	443%	182%	570%	184%	217%	198%
MAR 2011	1,049	1,567	1,806	686	392	1,152	5,501	6,653	10,262
NORMAL	596	1,003	567	209	206	299	2,581	2,880	4,707
DEPARTURE	453	564	1,239	477	186	853	2,920	3,773	5,555
% OF NORM	176% (Forecast)	156%	319%	328%	190%	385%	213%	231%	218%
APR 2011	668	1,535	650	207	250	1,279	3,310	4,589	14,851
NORMAL	649	1,080	481	144	180	360	2,534	2,894	7,601
DEPARTURE	19	455	169	63	70	919	776	1,695	7,250
% OF NORM	103%	142%	135%	144%	139%	355%	131%	159%	195%
MAY 2011	1,236	1,355	400	147	186	700	3,324	4,024	18,875
NORMAL	1,081	1,245	312	147	186	292	2,971	3,263	10,864
DEPARTURE	155	110	88	0	0	408	353	761	8,011
% OF NORM	114%	109%	128%	100%	100%	240%	112%	123%	174%
JUN 2011	1,851	2,916	460	152	178	350	5,557	5,907	24,782
NORMAL	1,612	2,667	423	152	178	286	5,032	5,318	16,182
DEPARTURE	239	249	37	0	0	64	525	589	8,600
% OF NORM	115%	109%	109%	100%	100%	122%	110%	111%	153%
JUL 2011	938	1,946	185	57	137	250	3,263	3,513	28,295
NORMAL	819	1,776	179	57	137	218	2,968	3,186	19,368
DEPARTURE	119	170	6	0	0	32	295	327	8,927
% OF NORM	115%	110%	103%	100%	100%	115%	110%	110%	146%
AUG 2011	353	604	65	39	115	150	1,176	1,326	29,621
NORMAL	353	604	65	39	115	131	1,176	1,307	20,675
DEPARTURE	0	0	0	0	0	19	0	19	8,946
% OF NORM	100%	100%	100%	100%	100%	115%	100%	101%	143%
SEP 2011	333	452	111	38	111	110	1,045	1,155	30,776
NORMAL	333	452	111	38	111	99	1,045	1,144	21,819
DEPARTURE	0	0	0	0	0	11	0	11	8,957
% OF NORM	100%	100%	100%	100%	100%	111%	100%	101%	141%
OCT 2011	385	523	66	5	120	86	1,099	1,185	31,961
NORMAL	385	523	66	5	120	78	1,099	1,177	22,996
DEPARTURE	0	0	0	0	0	8	0	8	8,965
% OF NORM	100%	100%	100%	100%	100%	110%	100%	101%	139%
NOV 2011	384	398	67	6	118	83	973	1,056	33,017
NORMAL	384	398	67	6	118	76	973	1,049	24,045
DEPARTURE	0	0	0	0	0	7	0	7	8,972
% OF NORM	100%	100%	100%	100%	100%	109%	100%	101%	137%
DEC 2011	329	247	0	12	100	56	688	744	33,762
NORMAL	329	247	0	12	100	52	688	740	24,785
DEPARTURE	0	0	0	0	0	4	0	4	8,976
% OF NORM	100%	100%	100%	100%	100%	108%	100%	101%	136%
				Calendar Y					
Monitor	8,537	12,300	4,249	1,653	2,010	5,013	28,749	33,762	
NORMAL	7,213	10,612	2,373	883 770	1,681 329	2,023	22,762 5,987	24,785 8 076	
DEPARTURE % OF NORM	1,324 118%	1,688 116%	1,876 1 <i>7</i> 9%	770 187%	329 120%	2,990 248%	5,987 126%	8,976 136%	
70 OF INOINI	110/0	110/0	117/0	10/70	120/0	44070	120/0	170/0	

NWO

From:

NWO

Sent:

Monday, April 04, 2011 1:54 PM

To:

Brant and Katie Keller; bjerke@westriv.com

Cc:

Subject:

creed@nd.gov; NWO; NWO;

NWO; Vohl, Neil W NWO; Farhat, Jody S NWD02; Swenson, Michael A NWD02

RE: Beulah (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: FOUO

Mr. Keller.

Releases from Garrison are currently at a 15,000 cfs daily average. This is less than

normal.

As elevations on the Knife River increase, that can impede inflows at some of the tributaries. The Knife River is currently at 16.5 feet at the Hazen gage. Per the National Weather Service's data, that equates to roughly 4600 cfs in flows.

You would not see a change in flows, or elevations, at the Knife River in Beulah even if we decreased flows further on the Missouri River. This is due to the change in elevation from the mouth of the Knife near Stanton, up to Beulah. You can only push so much water through the channel capacity of the Knife, regardless of what's down stream...

----Original Message----

From: Brant and Katie Keller [mailto:bkkeller@westriv.com]

Sent: Monday, April 04, 2011 1:39 PM

To: NWO; bjerke@westriv.com

Cc: creed@nd.gov; NWO; NWO;

NWO

Subject: RE: Beulah (UNCLASSIFIED)

I was just wondering what kind of release rates are coming out of Garrison Dam into the Missouri? Are they any less than normal or the same? You can see firsthand west of Beulah that the high level of the knife is not allowing spring creek to flow into it. Does anyone at what rate is the knife river flowing into the Missouri? Could we get see better flow if the Missouri was any lower?

NWO;

NWO;

NWO:

NWO;

Thanks,

Brant K

----Original Message----

From: NWO [mailto: @usace.army.mil]

Sent: Monday, April 04, 2011 1:00 PM

To: bjerke@westriv.com

Cc: creed@nd.gov; bkkeller@westriv.com; "

NWO; NWO

Subject: FW: Beulah (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: FOUO

Mayor Bjerke,

Shannon Jeffers, my Chief of Engineering, and I stopped over at Beulah Friday afternoon and took some elevations around the area you and I'd visited Friday morning. Attached is a drawing with those elevations and our recommendations.

Although we could not get elevations all the way along the drainage channel due to the existing snow, we took some shots at key locations. It appears as though it would make sense to construct a small sandbag structure across the end of Fair Street to preclude the water from running out of the ditch and flowing East. Although this would back up water in the ditch further to the North, the elevation we shot on Front Street indicated that it was 1.9 feet higher than the ditch bank adjacent to Fair Street. Thus our recommendation would be to construct the sandbag structure on Fair Street, no more than 2 feet high. This structure should not be higher than the adjacent ditch bank.

In fact, I'd leave it about 6 inches low so that if the backwater gets high enough it would still flow down Fair street, verses through an adjacent private residence.

As the City begins to see backwater in the drainage way, you should closely monitor the impacts in the immediate area. If it appears as though the back water will create other problems, via something like a low area in the drainage ditch up near the railroad tracks or at one of the residences, you could remove a row or two of the sandbags on Fair Street.

Even if you had to lower the structure on Fair Street, in order to prevent any other problems, the structure would still help alleviate some of the problems that residents conveyed to us with having very high flows running down Fair street. We also noted on the drawing that the culvert at the West end of 1st St. SW would also need to be plugged, or you will see backwater from that. I'm not sure if that presents a big issue for the City or not, as it sounds like backwater will eventually come from that area anyway.

Feel free to give either Shannon or I a call if you have any further questions and let me know if you need any further assistance? We can both be reached at 701-654-7411.

Operations Project Manager Garrison Project

Classification: UNCLASSIFIED

Caveats: FOUO

Classification: UNCLASSIFIED

Caveats: FOUO

APR 1, 2011 / BASIC CONDITION / 33.8 MAF / BALANCED FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE Elevations & Storages are for Date Shown Avg Discharge & Energy are Monthly Values Date of Study: April 1, 2011

				_	_	April 1,					0010	
	31-Mar-11	30-Apr	2011 31-May	30-Jun	31-Jul	'31-Aug	30-Sep	31-0ct	30-Nov	31-Dec	2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS	2238.7 7.4	2239.7 7.0	2241.0 10.5	2243.9 11.0	2243.9 11.0	2242.0 11.0	2240.6 10.5	2239.3 10.0	2238.3 10.0	2236.8 12.0	2235.3 13.0	2234.0 13.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1843.7 15.0	1845.0 22.0	1848.0 29.0	1848.6 29.0	1846.6 29.0	1844.6 29.6	1842.2 30.5	1840.1 30.5	1839.7 19.0	1838.4 25.0	1837.5 25.0
OAHE ELEV FTMSL DISCH KCFS	1614.3 13.9	1616.0 15.9	1615.7 28.4	1615.7 34.2	1614.2 37.1	1612.1 38.0	1609.8 41.8	1609.1 33.4	1607.9 36.1	1606.7 24.9	1606.9	1607.5 22.7
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 16.4	1420.0 28.4	1420.0 34.2	1420.0 37.0	1420.0 37.6	1420.0 41.4	1420.0 33.1	1420.0 35.8	1420.0 24.7	1420.0 23.6	1420.0 22.7
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1357.0 20.9	1355.2 33.2	1355.2 36.5	1355.2 37.5	1355.2 37.6	1353.5 43.8	1345.0 43.2	1337.6 43.3	1339.4 23.0	1344.9 18.2	1350.1 17.0
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 25.0	1206.0 35.5	1206.0 39.0	1206.0 39.0	1206.5 39.0	1207.5 45.0	1207.5 45.0	1207.5 45.0	1207.5 25.0	1207.5 20.0	1206.0 20.0
SYSTEM STORAGE 1000 AF ENERGY GWh PEAK POWER MW	61720 11089	63480 607 2389	63965 994 2397	65694 1128 2401	65376 1211 2394	63533 1219 2381	61633 1241 2370	59661 1162 2344	57931 1135 2293	57180 819 2293	56853 821 2314	56834 752 2320
						WER BASI				9 (CAT.C)		
	31-Mar-11	30-Apr	2011		<u> </u>	31-Aug		-			2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS	2238.7 7.4	2238.6 7.0	2238.0 11.0	2238.8 9.0	2237.7 9.0	2235.9 9.0	223 4 .9 7.5	2234.5 6.0	2233.9 6.3	2232.6 9.0	2230.9	2229.4 11.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1842.0 15.0	1842.4 19.5	1843.9 22.0	1843.4 22.0	1841.7 22.0	1840.5 19.3	1839.4 16.5	1838.6 16.5	1837.2 19.0	1835.2 24.0	1833.7 24.0
OAHE ELEV FTMSL DISCH KCFS	1614.3 13.9	1614.9 18.6	1613.6 28.9	1612.3 31.6	1609.9 33.7	1607.0 33.6	1604.5 30.8	1603.1 22.1	1602.3 19.5	1602.3 17.9	1602.8 21.1	1603.6 20.4
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 19.1	1420.0 28.9	1420.0 31.6	1420.0 33.6	1420.0 33.2	1420.0 30.3	1420.0 21.7	1420.0 19.1	1420.0 17.6	1420.0 21.1	1420.0 20.4
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1357.0 22.4	1355.2 32.7	1355.2 32.9	1355.2 33.7	1355.2 33.0	1353.5 32.5	1345.0 31.7	1337.5 26.5	1339.3 15.9	1344.8 15.7	1350.0 14.5
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 25.0	1206.0 33.9	1206.0 34.3	1206.0 34.3	1206.5 34.0	1207.5 33.5	1207.5 33.1	1207.5 28.2	1207.5 17.0	1207.5 17.0	1206.0 17.0
SYSTEM STORAGE 1000 AF ENERGY GWh PEAK POWER MW	61720 9061	62283 650 2369	61714 971 2376	61908 978 2377	60676 1040 2363	58846 1028 2332	57374 911 2318	55871 775 2296	54809 668 2255	54167 632 2256	53719 736 2276	53568 673 2282
	,					PER BASI SEAS +10						
	31-Mar-11	30-Apr	2011							31-Dec	2012 31-Jan	29-Feb
FORT PECK ELEV FTMSL DISCH KCFS	2238.7 7.4	2241.2 8.0	2243.0 15.0	2248.7 14.0	2248.4 17.5	2245.5 18.0	2242.8 17.9	2240.1 18.0	2237.5 17.7	2236.3 12.0	2235.0 13.0	2234.0 13.0
GARRISON ELEV FTMSL DISCH KCFS	1840.5 21.8	1842.7 25.5	1843.0 40.0	1848.8 40.0	1850.2 40.0	1848.0 40.0	1845.6 41.5	1843.0 41.5	1841.0 40.3	1840.4 22.0	1838.7 28.0	1837.5 28.0
OAHEELEV FTMSL DISCH KCFS	1614.3 13.9	1616.8 23.7	1616.8 47.3	1617.5 45.9	1615.4 53.5	1613.1 50.9	1610.7 55.3	1609.6 47.3	1608.0 49.7	1606.8 28.0	1606.9 27.2	1607.5 26.1
BIG BEND ELEV FTMSL DISCH KCFS	1420.5 17.2	1420.0 24.2	1420.0 47.3	1420.0 45.9	1420.0 53.4	1420.0 50.7	1420.0 55.0	1420.0 47.0	1420.0 49.6	1420.0 27.9	1420.0 27.2	1420.0 26.1
FORT RANDALL ELEV FTMSL DISCH KCFS	1357.7 15.1	1358.0 27.6	1362.0 44.6	1362.0 49.8	1360.0 57.3	1355.2 57.7	1353.5 57.7	1345.0 57.3	1337.5 57.3	1339.3 26.3	1344.8 21.9	1350.0 20.6
GAVINS POINT ELEV FTMSL DISCH KCFS	1206.5 21.0	1206.0 32.0	1206.0 48.0	1206.0 54.0	1206.0 59.5	1206.5 59.5	1207.5 59.5	1207.5 59.5	1207.5 59.5	1207.5 29.0	1207.5 24.0	1206.0 24.0
SYSTEM STORAGE 1000 AF ENERGY GWh PEAK POWER MW	61720 13882	63881 868 2384	64728 1462 2350	68409 1419 2361	67867 1561 2369	65166 1525 2385	62765 1510 2373	60233 1455 2352	58036 1391 2291	57318 917 2295	56888 927 2314	56830 848 2320

STUDY NO

FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE
VALUES IN 1000 AF EXCEPT AS INDICATED TIME OF STUDY 15:01:38 AR11 2011 INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB --FORT PECK-NAT INFLOW DEPLETION EVAPORATION MOD INFLOW RELEASE 11 94 248 676 -429 16562 2242.0 11.0 234 30 674 676 -2 16991 2243.9 11.0 -22 24 100 159 -59 15721 2238.3 10.0 492 483 6174 7188 -41 45 187 298 298 525 -42 -19 -132 -153 -118 -42 101 326 615 -289 15941 2239.3 10.0 -75 117 291 623 -332 16230 2240.6 10.5 410 738 88 646 292 16322 2241.0 10.5 655 671 16993 2243.9 11.0 417 799 748 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -1014 15803 2238.7 7.4 16029 223 9.7 7.0 -110 15831 2238.8 10.0 -51 15780 2238.6 10.0 -328 15393 2236.8 12.0 -334 15059 2235.3 13.0 -270 14789 2234.0 POWER AVE POWER MW PEAK POW MW 166 166 49.7 166 167 107.8 169 109.7 164 120.1 169 168 $\frac{145}{167}$ 166 163 23.2 ENERGY GWH 1176.6 69.8 114.0 113.6 104.4 103.0 121.8 113.2 -GARRISON--65 0 27 303 484 -181 18934 765 -5 NAT INFLOW DEPLETION CHAN STOR -3 4 177 -34 -142 5 135 -87 -10 602 107 -25 5 115 1.0593 -121 -56 -57 -55 552 -115 -20 57 1023 567 907 EVA PORATION 893 1066 20115 1843.7 15.0 423 -159 19115 1840.7 30.5 17 90 13 53 4 37 205 52 17131 -937 19049 1726 1075 21627 1783 202 21830 1783 -719 21110 1760 -673 20437 1875 -823 19615 1537 -400 18389 REG INFLOW RELEASE 1438 -145 1878 9 STOR CHANGE STORAGE -341 19274 1841.2 30.5 -277 18112ELEV FTMSL DISCH KCFS 1840.5 1845.0 22.0 1848.0 1848.6 1846.6 1844.6 29.6 1842.2 1840.1 30.5 1839.7 19.0 1838.4 25.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 500 210.3 502 270.5 502 282.2 501 281.1 488 289.1 476 178.2 468 216.2 499 481 480 471 2649.4 137.6 274.6 138.8 64.6 232.6 --OA HE---10 -4 110 1837 2056 -219 19340 609.1 33.4 NAT INFLOW DEPLETION CHAN STOR 145 -25 116 18 -24 28 173 1 45 56 1146 1531 -385 18588 1606.7 24.9 -10 534 18061 20317 25 -25 -2 23 416 1626 2335 -708 20335 1612.1 38.0 1712 2487 -776 19559 1609.8 1761 2279 -518 21043 1614.2 475 670 -195 18973 1607.9 EVAPORATION REG INFLOW RELEASE 890 986 944 575 21668 1616.0 15.9 2033 -18 21561 1615.7 34.2 1745 -77 19168 1608.6 57 18645 1606.9 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -89 21579 215.7 28.4 -95 19245 1608.8 -2256 21093 1614.3 13.9 18837 37.1 41.8 33.1 35.5 42.2 23.6 POWER MW PEAK POW MW ENERGY GWH 752 153.5 750 329.7 743 367.9 732 716 323.2 705 708 720 715 $\frac{321}{704}$ 3228.9 283.8 373.4 77.1 104.3 238.7 393.0 154.6 225.6 204.0 EVA PORA TION
REG INFLOW
RELEASE
STORAGE
ELEV FIMSL
DISCH KCFS 2315 2315 1621 1420.0 37.6 24 63 24 63 1621 1420 · 0 2035 2035 1621 420.0 33.1 2273 1621 1420.0 37.0 976 976 1621 120.0 32.8 20244 1651 1420.5 17.2 974 1621 1420.0 16.4 1745 1621 420.0 28.4 488 1621 1420.0 35.2 664 1621 1420.0 41.9 2033 1621 1520 1621 1450 1621 1420.0 1308 1621 420.0 34.2 420.0 POWER AVE POWER MW PEAK POW MW 509 509 509 509 517 538 538 538 538 538 528 538 ENERGY GWH 1170.6 54.4 98.8 115.1 128.7 131.0 141.0 120.0 58.7 29.4 39.8 92.0 85.9 75.8 --FORT RANDALL--NAT INFLOW DEPLETION EVAPORATION 77 117 20788 21426 -638 3770 1357.7 3 10 1521 1414 107 2408 18 8 3 12 3 0 4 25 2314 2313 24 62 26 07 -1 45 34 05 2014 2656 -642 2764 1242 -65 3705 2173 0 3549 2304 0 3549 601 -116 2327 1122 350 2758 2039 -156 3549 687 -27 2301 REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS POWER -320 2443 374 3132 3 550 1357.0 1355.2 1355.2 37.5 1353.5 1345.0 1340.1 1339.4 355.2 36.5 1355.2 37.6 1338.1 1337.6 43.2 43.3 43.3 43.3 18.2 17.0 356 220.6 356 234.7 356 208.9 356 233.8 319 240.6 AVE POWER MW PEAK POW MW 288 286 294 125.1 350 319 339 ENERGY GWH 2046.8 129.4 245.4 108.2 48.3 54.4 103.0 94.4 -GAVINS POINT-NAT INFLOW DEPLETION CHAN STOR EVAPORATION 19 -24 24 -6 5 0 10 38 115 39 -2 2 10 0 ő -11 -1ž 0 2 -5 36 625 $\begin{array}{c} 4 \\ 1537 \end{array}$ 27 03 26 78 25 380 1207 . 5 45 . 0 REG INFLOW RELEASE 22827 $\frac{1476}{1488}$ 2183 2321 2398 2398 2767 714 1230 1150 STOR CHANGE STORAGE 355 1206.5 39.0 -12 354 -12-38 3421207.5 45.0 1207.5 25.0 1207.5 45.0 34.2 ELEV FTMSL DISCH KCFS 1206.5 1206.0 1206.0 1206.0 1206.0 1207.5 45.0 1206.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 114 61.9 $\begin{array}{c} 70\\114\\48.7\end{array}$ 115 85.1 116 82.9 116 86.2 116 22.3 117 65.3 $\substack{114\\114\\82.1}$ $\substack{114\\114\\84.8}$ 116 41.7 116 19.5 117 52.5 84.0 817.0 --GAVINS POINT - SIOUX CITY-NAT INFLOW 3196 1279
DEPLETION 252 22
REGULATED FLOW AT SIOUX CITY
KAF 25771 2745
KCFS 46.1 31 36 39 3 14 36 14 24 13 46.3 44.4 42.4 40.9 27 64 46 . 4 46.2 46.2 46.2 25.7 20.4 21.4 46.2 --TOTAL--NAT INFLOW DEPLETION CHAN STOR -69 -209 -204 -25 2548 295 -163 -36 -149-130 -83 -63 -68 Ō EVAPORATION STORAGE SYSTEM POWER 65376 63533 61633 38 0 5966 1 58795 5 6853 2389 606.6 20.2 2397 993.7 2381 1218.9 39.3 2370 1241.3 41.4 2344 1162.0 37.5 2312 551.8 36.8 2301 262.1 37.4 2320 752.2 25.9 AVE POWER MW PEAK POW MW ENERGY GWH 1127.7 37.6 1211.3 39.1 821.3 26.5 22 93 320 .8 819.4 11089.3 DAILY GWH 32.1 40.1 26.4

INI-SUM 30APR 31MAY

30JUN 31JUL

31AUG

30SEP

310CT

15NOV

22 NOV

30NOV

31DEC 31JAN

29 FEB

DATE OF STODY 04/01/11	·			99001 9901 9901 PAGE	
TIME OF STUDY 15:01:52	FULL SERV / SHTN NA	V SEAS O DAYS / PULSE MA VALUES IN 1000 AF EXCE	AY 16.9 (CALC) PT AS INDICATED	STUDY NO	8
31MAR11 INI-SUM 30APR	2011		.5NOV 22NOV 30NOV 31DEC	2012 31JAN 29FEB	
FORT PECK NAT INFLOW 4814 434 DEPLETION 408 38 EVAPORATION 568 MOD INFLOW 3838 396 RELEASE 5786 417 STOR CHANGE -1948 -21 STORAGE 15803 15782 ELEV FTMSL 2238.7 2238.6	742 1111 563 195 405 219 35 547 706 309 676 536 553 170 -245 15653 15824 15579 2238.0 2238.8 2237.7 11.0 9.0 9.0	1 -108 -90 . 110 137 119 171 237 279 553 446 369 -382 -209 -90 15197 14988 14899 1 2235.9 2234.9 2234.5 22	154 72 82 263 -24 -11 -13 -80 54 25 28 61 124 58 66 282 179 31 11 553 -55 -25 -45 -272 4844 14819 14774 14502 34.3 2234.1 2233.9 2232.6 6.0 6.0 7.0 9.0	250 288 -69 -55 319 343 676 633 -357 -290 14145 13855 2230.9 2229.4 11.0 11.0	
POWER AVE POWER MW 97 PEAK POW MW 166 ENERGY GWH 952.7 69.7	150 124 124 165 166 165 111.6 89.5 92.4	124 103 82 164 163 163	82 82 95 122 162 162 162 161 29.5 13.8 18.3 91.0	146 145 160 159 108.8 101.2	
GARRISON NAT INFLOW 7002 998 DEPLETION 901 21 CHAN STOR -36 4 EVAPORATION 660	813 1750 1168 111 524 493 -39 19 41		159 74 85 198 -93 -43 -50 -52 -10 -28 32 69	209 285 -22 -12 -20	
REG INFLOW 11191 1397 RELEASE 13274 8505 STOR CHANGE -2083 505 STORAGE 19049 19554 ELEV FTMSL 1840.5 1842.0 1 DISCH KCFS 21.8 15.0	1340 1781 1187 1199 1309 1353 140 472 -166 19694 20166 20000 1842.4 1843.9 1843.4 19.5 22.0 22.0	1353 1147 1015 -557 -377 -370 19444 19067 18696 1 1841.7 1840.5 1839.4 18	369 172 203 714 491 229 262 1168 -122 -57 -59 -454 .8575 18518 18459 18005 39.0 1838.8 1838.6 1837.2 16.5 16.5 16.5 19.0	888 930 1476 1381 -588 -451 17417 16966 1835.2 1833.7 24.0 24.0	
POWER AVE POWER MW 190 PEAK POW MW 485 ENERGY GWH 2020.0 137.0	248 281 282 491 499 498 184.5 202.2 209.5	280 244 208 483 479 475	207 207 207 237 474 473 472 467 74.7 34.8 39.7 176.1	295 292 460 454 219.5 203.1	
OAHE NAT INFLOW 1380 423 DEPLETION 632 49 CHAN STOR -10 25 EVAPORATION 620	240 276 111 71 145 173 -16 -9	116 28 -10 11 11	27 13 14 1 0 1 12 -10 57 26 30 65	10 72 18 28 -21	
REG INFLOW 13393 1292 RELEASE 16824 1105 STOR CHANGE -3431 186 STORAGE 21093 21279 ELEV FTMSL 1614.3 1614.9 1015CH KCFS 13.9 18.6	1352 1431 1250 1776 1879 2072 -425 -449 -822 20854 20406 19584 1613.6 1612.3 1609.9 28.9 31.6 33.7	2068 1835 1361 -903 -766 -399 18681 17915 17516 1 1607.0 1604.5 1603.1 16	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	1447 1425 1299 1172 148 253 17409 17662 1602.8 1603.6 21.1 20.4	
POWER AVE POWER MW 249 PEAK POW 746 ENERGY GWH 2629.8 179.2	385 418 441 740 733 720 286.5 301.0 328.4	435 393 280 705 692 685 323.4 283.1 208.4	249 280 205 225 682 681 680 680 89.7 47.1 39.3 167.2	266 257 683 687 197.5 178.9	
DISCH KCFS 17.2 19.1	8 1776 1879 2064 1776 1879 2064 1621 1621 1621 1420.0 1420.0 1420.0 28.9 31.6 33.6	2044 1804 1334 2044 1804 1334 1621 1621 1621 1420.0 1420.0 1420.0 14	12 6 7 14 576 304 252 1085 576 304 252 1085 1621 1621 1621 1621 20.0 1420.0 1420.0 1420.0 19.4 21.9 15.9 17.6	1299 1172 1299 1172 1621 1621 1420.0 1420.0 21.1 20.4	
POWER 88 AVE POWER MW 495 ENERGY GWH 965.6 63.4	135 148 157 509 509 509 100.6 106.4 116.9	509 517 538	97 110 80 89 538 538 538 538 35.0 18.5 15.4 66.1	104 98 538 529 77.1 68.0	
DISCH KCFS 15.1 22.4	88 91 34 9 12 18 10 1855 1958 2070 2011 1958 2070 -156 349 3549 3549 1355.2 1355.2 1355.2 32.7 32.9 33.7	15 7 1 32 39 31 2028 1788 1306 2028 1934 1949 0 -146 -643 3549 3402 2759	3 1 1 1 10 1 0 1 3 565 300 248 1080 887 416 274 978 -322 -116 -26 102 2437 2321 2295 2397 40.0 1337.9 1337.5 1339.3 29.8 30.0 17.3 15.9	20 39 3 3 1316 1208 966 834 350 374 2747 3121 1344.8 1350.0 15.7 14.5	
POWER AVE POWER MW 193 PEAK POW MW 362 ENERGY GWH 1742.5 138.6	277 277 283 356 356 356 206.1 199.2 210.4	277 271 254 356 350 319 206.3 195.4 188.7	225 219 126 117 296 287 285 293 81.0 36.8 24.1 86.8	119 115 319 339 88.7 80.3	1 2 3
GAVINS POINT NAT INFLOW 1099 163 DEPLETION 115 5 CHAN STOR 0 -14 EVAPORATION 45 REG INFLOW 18577 1476 RELEASE 18589 1488 STOR CHANGE -12 -12 STORAGE 354 342 ELEV FTMSL 1206.5 1206.0 1 DISCH KCFS 21.0 25.0	112 107 82 19 24 39 -20 0 -1 2084 2041 2109 342 342 342 1206.0 1206.0 1206.0 33.9 34.3 34.3	1 1 1 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1	47 22 25 80 5 2 3 10 3 0 24 3 4 2 2 5 928 433 317 1045 928 433 317 1045 380 380 380 380 07.5 1207.5 1207.5 1207.5 31.2 31.2 20.0 17.0	80 104 1 0 2 1045 940 1045 978 380 382 1207.5 1206.0 17.0 17.0	
POWER MW 86 AVE POWER MW 114 PEAK POW MW 114 ENERGY GWH 750.4 61.9	110 111 111 114 114 114 81.6 79.6 82.2	110 111 111 115 117 117 82.1 79.8 82.5	107 107 71 60 117 117 117 117 38.3 17.9 13.5 44.7	60 60 117 114 44.7 41.5	
GAVINS POINT - SIOUX CITY- NAT INFLOW 2104 831 DEPLETION 252 22 REGULATED FLOW AT SIOUX CITY KAF 20441 2297 KCFS 38.6	420 210 150 36 31 39	2175 2056 2093	33 15 18 45 6 3 3 13 955 446 332 1077 32.1 32.1 20.9 17.5	32 74 14 14 1063 1038 17.3 18.0	
TOTAL NAT INFLOW 16886 2984 DEPLETION 2385 139 CHAN STOR -46 15 EVA PORATION 2167 STORAGE 61720 62283 SYSTEM POWER	2415 3545 2108 441 1141 981 -75 10 -1 138 61714 61908 60676	. 289 -161 -66 . 1 26 28 . 427 527 451 . 58846 57374 55871 5	422 197 225 596 -104 -49 -55 -94 3 0 14 -28 200 92 105 227 5245 54952 54809 54167	601 862 -55 -22 -41 2 53719 53568	
AVE POWER MW 903 PEAK POW MW 2369 ENERGY GWH 9061.0 649.8 DAILY GWH 21.7	1305 1358 1398 2376 2377 2363 970.9 977.8 1039.8 31.3 32.6 33.5	3 2332 2318 2296 3 1027.9 911.2 774.8 3	968 1005 783 849 2269 2258 2255 2256 848.3 168.8 150.4 631.9 23.2 24.1 18.8 20.4	990 967 2276 2282 736.4 673.0 23.8 23.2	

INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 31DEC 31JAN 29FEB

DATE OF STUDY 04/04/11					99001	9901 9901 PAGE 1
TIME OF STUDY 09:59:25 31MAR11	2011	VALUE	S IN 1000 AF E	Y PULSE XCEPT AS INDICATED 15NOV 22NOV 30NOV	31DFC 31.TAN	STUDY NO 5
PORM DECK						432
NAT INFLOW 9496 102 DEPLETION 240 -2 EVAPORATION 338 MOD INFLOW 8918 104	3 260 513 5 1332 2213	3 204 -62 23 73 3 981 413	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	-123 -146 38 480 520	-105 537
STOR CHANGE -1011 56	9 922 833 9 410 1380) 1076 1107) -95 -694	-629 -633	-293 -137 -140	-258 -279	-211
STORAGE 15803 1637 ELEV FTMSL 2238.7 2241. DISCH KCFS 7.4 8. POWER						
AVE POWER MW 11 PEAK POW MW 16 ENERGY GWH 1302.7 79.	9 124.9 122.9	3 172 170 3 128.2 127.3	168 166 121.8 124.3	165 165 164 59.6 27.7 31.6	164 163 119.7 121.5	162 113.1
GARRISON NAT INFLOW 13940 179 DEPLETION 988 1 CHAN STOR -53 - EVAPORATION 385 REG INFLOW 22443 224 RELEASE 23378 151 STOR CHANGE -935 73 ETOROET 19044 127	3 1792 4384 3 100 802 6 -68 10	2562 725 2 621 93 3 -33 -5	542 628 -133 1 -1	239 112 127 -118 -55 -63 10	296 313 -117 -96 49 -10	427 -64
EVAPORATION 385 REG INFLOW 22443 224 RELEASE 23378 151	5 2547 4425 7 2460 2380	27 84 5 2958 1650 2460 2460	103 87 1640 1647 2467 2552	20 9 11 872 407 459 1235 576 587	44 1156 1199 1353 1722	1239 1611
STOR CHANGE -935 /2 STORAGE 19049 1977 ELEV FTMSL 1840.5 1842. DISCH KCFS 21.8 25.						
POWER AVE POWER MW 32 PEAK POW MW 49	3 489 500 5 498 503	503 503 504 502	501 499 500 498	491 483 454 484 482 481	278 351 479 473	348 468
ENERGY GWH 3491.0 232.	3 363.5 360.2				206.9 261.0	
OAHE NAT INFLOW 2907 83 DEPLETION 632 4 CHAN STOR -18 -1 EVAPORATION 373 REG INFLOW 25263 225 RELEASE 27517 144 STOR CHANGE -2255 88 STORAGE 21093 2197 ELEV FTMSL 1614.3 1616. DISCH KCFS 13.9 23.7	7 71 145 4 -52	26 81 26 81	28 -10 -5 0 99 84	1 0 1 18 20 9 10	12 18 59 -24 42	28
REG INFLOW 25263 229 RELEASE 27517 140 STOR CHANGE -2255 88	2 2897 2987 9 2906 2731 3 -9 256	7 2526 2340 3288 3129 5 -762 -789	2468 2556 3291 2908 -823 -352	1254 585 615 1390 682 887 -136 -97 -272	1358 1694 1722 1672 -365 22	1691 1502 189
STORAGE 21093 219. ELEV FTMSL 1614.3 1616. DISCH KCFS 13.9 23.	6 21967 22223 8 1616.8 1617.5 7 47.3 45.9	3 21461 20672 5 1615.4 1613.1 5 53.5 50.9	19849 19497 1610.7 1609.6 55.3 47.3	19361 19264 18992 1609.2 1608.9 1608.0 46.7 49.1 55.9	18628 18650 1606.8 1606.9 28.0 27.2	18838 1607.5 26.1
POWER AVE POWER MW 31 PEAK POW MW 75 ENERGY GWH 4342.0 229.	8 633 617 6 756 760	7 703 665 749 737	702 612 725 719	604 628 693 717 715 711	361 349 704 705	336 708
BIG BEND EVAPORATION 71 REG INFLOW 27447 140	9 2906 2731 9 2906 2731	5 15 3284 3115	19 16 3272 2892	4 2 2 1386 680 885 1386 680 885	9 1714 1672	1502
RELEASE 27477 143 STORAGE 1651 162 ELEV FTMSL 1420.5 1420. DISCH KCFS 17.2 24	9 2906 2731 1 1621 1621 0 1420.0 1420.0	3284 3115 1621 1621 1420.0 1420.0	3272 2892 1621 1621 1420.0 1420.0	1386 680 885 1621 1621 1621 1420.0 1420.0 1420.0	1714 1672 1621 1621 1420.0 1420.0	1502
DISCH KCFS 17.2 24. POWER AVE POWER MW 11 PEAK POW MW 48					139 133	125
ENERGY GWH 1544.3 79.	5 150.2 141.2	2 175.6 176.1	187.0 169.4	82.7 40.6 52.5	103.6 98.9	
FORT RANDALL NAT INFLOW 968 23 DEPLETION 77 EVAPORATION 82 REG INFLOW 28288 166 RELEASE 28936 166 STOR CHANGE -648 27 CTORDER 2770 2770 2770 2770 2770 2770 2770 277	0 206 243 4 9 12	8 80 47 2 18 15 6 19	46 6 7 1 24 18	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	14 30 3 3 7	59 3
REG INFLOW 28288 166 RELEASE 28936 164 STOR CHANGE -648 2 STORAGE 3770 379	5 3103 2962 2 2743 2962 3 360 3 4153 4153	2 3339 3127 2 3521 3549 -182 -422 3 3971 3549	3288 2878 3434 3522 -146 -643	1385 680 884 1706 796 910 -321 -116 -26 2438 2322 2296	1721 1699 1619 1349 102 350 2398 2748	1558 1184 374 3122
	1362.0 1362.0	1360.0 1355.2	1353.5 1345.0	1340.0 1338.0 1337.5	1339.3 1344.8	
AVE POWER MW 23 PEAK POW MW 36 ENERGY GWH 2352.3 171.	5 375 375	370 354	349 317	294 285 283	293 319	163 339 113.6
GAVINS POINT NAT INFLOW 1969 27 DEPLETION 115	5 19 24	9 10	-5 2	5 2 3	10 1	156
CHAN STOR -13 -2 EVAPORATION 24 REG INFLOW 30753 189 RELEASE 30765 190	2 2951 3213	2 3 3659 3672	6 6 3566 3659	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	3 1783 1476	2 1343 1381
STOR CHANGE -12 -1 STORAGE 354 34	2 2 342 342	13 2 342 355	25 380 380		380 380	-38 342
DISCH KCFS 21.0 32. POWER . AVE POWER MW 10 PEAK POW MW 1	0 48.0 54.0 6 112 113) 59.5 59.5 L 110 111	5 59.5 59.5 . 113 115	59.5 59.5 59.5 115 115 115	29.0 24.0 101 84	
ENERGY GWH 849.3 76GAVINS POINT - SIOUX CIT	3 83.5 79.9 Y	9 81.7 82.4	81.6 85.2	41.2 19.2 22.0	75.3 62.7	58.1
NAT INFLOW 4014 152 DEPLETION 252 2 REGULATED FLOW AT SIOUX CI KAF 34527 340	2 36 31 TY	L 39 36	5 24 11	6 3 3	13 14	110 14 1477
KCFS 57.	2 61.1 62.9	9 64.6 61.8	8 61.3 61.0	61.0 61.0 61.0	29.9 24.6	25.7
NAT INFLOW 33294 568 DEPLETION 2304 CHAN STOR -81 -4	5 495 152°	7 1094 208 0 -47 -6	3 -208 -85 -5 0	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-202 -206 168 -26	1292 -124 2
EVAPORATION 1272 STORAGE 61720 6388 SYSTEM POWER AVE POWER MW 120			62765 60233	59120 58601 58036	57318 56888	56830 1218
PEAK POW MW 238	4 2350 2363 2 1461.9 1418.8	l 2369 2385 3 1561.1 1524.7	5 2373 2352 7 1509.8 1454.7	2312 2299 2291 687.5 322.7 380.9	2295 2314 916.6 927.3	2320 847.7
				1 ENOV 22NOV 20NOV	31000 31 77 17	2000

INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB



From:

Rouse, Karen [karen.rouse@dnr.mo.gov]

Sent:

Monday, April 04, 2011 8:52 AM

To: Subject: Farhat, Jody S NWD02

RE: Gavins Point March Spring Pulse Update (UNCLASSIFIED)

Jody -

I apologize if there was someone more appropriate to send this question to, but I am looking for clarification on where the temperature reading below Gavins Point Dam is measure from for the Spring Rise pulses? There is quite a discrepancy between the Gavins Point, Yankton and Sioux City readings. Thanks!

Karen Rouse
Hydrologist III
Water Resources Center
Missouri Department of Natural Resources
1101 Riverside Dr.
Jefferson City, MO 65102
(573) 751-0648
karen.rouse@dnr.mo.gov

```
----Original Message----
From: Farhat, Jody S NWD02 [mailto:Jody.S.Farhat@usace.army.mil]
Sent: Friday, March 25, 2011 12:47 PM
To: Farhat, Jody S NWD02; aaron popelka@moran.senate.gov; Adams, Steve;
alan.feyerherm@mail.house.gov; NWD; ansley.mick@mail.house.gov;
              NWD; NWD; Blechinger, Erik T NWO;
brian klippenstein@blunt.senate.gov; brianne dugan@baucus.senate.gov; Bryggman, Tim; Casteel,
Kelly D.; chad.ramey@mail.house.gov; Charlie Scott; chrisbrown@mail.house.gov;
christina.mahoney@mail.house.gov; Cindy Hall@mccaskill.senate.gov;
colin.brainard@mail.house.gov;
d schwietert@thune.senate.gov; Dan.Engemann@mail.house.gov; darwin.curls@mail.house.gov;
dayle williamson@bennelson.senate.gov; Dean.Mathisen@mail.house.gov;
deb.vanmatre@mail.house.gov; NWD02; don canton@hoeven.senate.gov; Eckert
Uptmor, Kayla A NWO; edwin.elfmann@mail.house.gov; Engelhardt, Bruce W.;
eric.bierwagen@mail.house.gov; eric.bohl@mail.house.gov; erick lutt@bennelson.senate.gov;
                                  NWK; HQ; Garland.Erbele@state.sd.us;
Farmer, Monique L NWO;
gary.marble@mail.house.gov; Gaul, Steve; NWK; NWK;
    NWD02:
                            NWD02; <a href="mailto:harold-stones@roberts.senate.gov">harold-stones@roberts.senate.gov</a>; Henry Maddux;
Hofmann, Anthony J COL NWK;
                              NWK; janna.worsham@mail.house.gov; Frazier,
Jennny; Mitas, Jim MVS External Stakeholder; Jim.Riis@state.sd.us; Drew, John; Rouse, Karen;
ken.kopocis@mail.house.gov;
                                        NWK;
                                                               NWD02; 🗯
                                NWD02; Mark.Rath@state.sd.us;
NWK; NWO;
marty boeckel@conrad.senate.gov; Mcallister, Roy F. Jr NWO; McMahon, John R BG NWD;
melissa.roe@mail.house.gov; mike.hayden@outdoorks.com; mike.matousek@mail.house.gov;
nathan taylor@tester.senate.gov; nathan vanderplaats@harkin.senate.gov;
nichole distefano@mccaskill.senate.gov; patrick.carroll@mail.house.gov;
patrick lehman@johanns.senate.gov;
peter henry@blunt.senate.gov; phil erdman@johanns.senate.gov; 
randy.vogel@mail.house.gov; NWO; richard.henkle@mail.house.gov;
richard bender@harkin.senate.gov; Ruch, Robert J COL NWO; ryan flickner@roberts.senate.gov;
Schenk, Kathryn M NWO; scott.corrie@mail.house.gov;
shane goettle@hoeven.senate.gov; sharon boysen@johnson.senate.gov;
```

sherry kuntz@grassley.senate.gov;

NWK;

HODA; 🛡

NWD02; Stephen Guertin; stephenne harding@tester.senate.gov; 9

NWD02; NWD02; NWD; Todd Sando; tracee sutton@conrad.senate.gov; Tracy Streeter; wayne.brincks@mail.house.gov; Wayne NelsonStastny@fws.gov; Wells, Mike; Westrup,

Nathan; zach nelson@bennelson.senate.gov

Subject: RE: Gavins Point March Spring Pulse Update (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

All - the March spring pulse from Gavins Point dam remains on hold due to high flows on the James River in eastern South Dakota, and flows on the Missouri River in excess of the downstream flow limits at Omaha and Nebraska City.

The status of the March pulse is not expected to change over the next several days; a press release cancelling the pulse is planned for Monday, March 28 unless conditions change dramatically over the weekend, which is very unlikely.

Each day a PowerPoint presentation documenting our decision making process will be posted on our website at: http://www.nwd-mr.usace.army.mil/rcc/

Call or email if you have questions.

Regards, Jody

Jody Farhat, P.E. Chief, Missouri River Basin Water Management

jody.s.farhat@usace.army.mil Office: 402-996-3840

Classification: UNCLASSIFIED

Caveats: NONE

From:

NWD02

Sent:

Friday, April 01, 2011 3:33 PM

To:

Farhat, Jody S NWD02

Cc:

NWD02

Subject:

Draft Monthly Studies (UNCLASSIFIED)

Attachments:

resfcastapr.pdf

Classification: UNCLASSIFIED

Caveats: NONE

Jody,

Here are the draft monthly studies. We can discuss on Monday before sending it out to all.

Thanks,

Hydraulic Engineer

Missouri River Basin Water Management Division

Classification: UNCLASSIFIED

Caveats: NONE

EVAPORATION

STORAGE SYSTEM POWER

AVE POWER MW PEAK POW MW ENERGY GWH

DAILY GWH

INI-SUM 30APR

63 480

2389 606.6 20.2

2397 993.7 32.1

1127.7

37.6

31MAY 30JUN 31JUL

11089.3

65376

2394 1211.3

39.1

63533

2381 1218.9 39.3

31 AUG

61633

2370 1241.3

41.4

30SEP

38 Õ 5966 1

2344 1162.0 37.5

310CT

58795

2312 551.8

36.8

15NOV

2301 262.1 37.4

22 NOV

ลลิ

2293 320.8

40.1

30NOV

57180

2293 819.4

26.4

31DEC

5 6853

2314 821.3 26.5

31JAN

2320 752.2 25.9

29 FEB

DATE OF STUDY 04/01/11 APR 1, 2011 / BASIC CONDITION / 33.8 MAF / BALANCED 99001 9901 4 PAGE FULL SERV / NAV SEAS +10 DAYS / NO MAY PULSE VALUES IN 1000 AF EXCEPT AS INDICATED TIME OF STUDY 15:01:38 STUDY NO AR11 2011 INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB --FORT PECK-NAT INFLOW DEPLETION EVAPORATION 234 30 674 676 -2 16991 2243.9 11.0 11 94 248 676 -429 16562 2242.0 11.0 -75 117 291 623 -332 16230 2240.6 10.5 -42 101 326 615 -289 15941 2239.3 10.0 -19 21 88 139 -51 15780 2238.6 10.0 -22 24 100 159 -41 45 187 298 298 525 -153 -118 32 9 -13 2 410 738 -328 15393 6174 7188 655 671 16993 2243.9 11.0 417 226 16029 2239.7 7.0 799 748 MOD INFLOW 646 292 16322 2241.0 10.5 RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -110 15831 2238.8 10.0 -59 15721 2238.3 10.0 -334 15059 2235.3 13.0 -270 14789 -1014 15803 2238.7 7.4 2236.8 POWER AVE POWER MW PEAK POW MW 166 166 167 169 169 168 167 166 166 165 164 163 ENERGY GWH 1176.6 69.8 107.8 109.7 114.0 113.6 104.4 103.0 49.7 23.2 26.5 120.1 121.8 113.2 -- GARR TSON --65 0 27 303 484 -181 18934 -142 5 135 1087 1760 -673 20437 NAT INFLOW DEPLETION CHAN STOR -3 4 177 -34 -115 -20 57 1023 1168 -87 -10 765 -5 -25 5 602 107 -121 -57 -55 552 -56 1064 1783 -719 21110 1846.6 29.0 265 423 -159 19115 1840.7 30.5 115 1053 1875 -823 19615 1842.2 30.5 567 907 -341 19274 1841.2 30.5 **EVAPORATION** 17131 -937 19049 1840.5 21.8 1 958 893 1 066 20115 1843.7 15.0 17 90 1353 437 20552 1726 1075 21627 1783 202 21830 1537 -400 18389 REG INFLOW RELEASE 1438 STOR CHANGE STORAGE -145 18789 -277 18112 ELEV FIMSL DISCH KCFS POWER 1845.0 1848.0 1848.6 29.0 1844.6 1840.1 1839.7 1838.4 AVE POWER MW PEAK POW MW ENERGY GWH 499 2649.4 137.6 502 270.5 502 282.2 501 281.1 499 274.6 488 289.1 476 178.2 500 471 481 480 210.3 232.6 138.8 64.6 -10 -4 110 1837 2056 -219 19340 1609.1 33.4 NAT INFLOW DEPLETION CHAN STOR 18 -24 173 116 -2 129 1712 2487 -776 19559 609.8 41.8 45 56 1146 1531 -385 18588 606.7 24.9 0 0 23 416 493 -77 19168 1608.6 25 -25 -25 1761 2279 -518 21043 1614.2 37.1 1626 2335 -708 20335 1612.1 38.0 -10 534 18061 20317 -2256 21093 1614.3 13.9 EVAPORATION REG INFLOW RELEASE 890 986 475 670 944 575 21668 1616.0 15.9 2033 -18 21561 1615.7 34.2 1745 57 18645 1606.9 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -89 21579 1615.7 28.4 -95 19245 608.8 -195 18973 1607.9 18837 33.1 35.5 42.2 23.6 POWER AVE POWER MW PEAK POW MW ENERGY GWH 743 367.9 732 373.4 720 393.0 716 323.2 750 329.7 710 $\frac{321}{704}$ 77.1 225.6 3228.9 153.5 283.8 154.6 104.3 238.7 204.0 --BIG BEND-EVAPORATION REG INFLOW RELEASE 2315 2315 1621 1420.0 37.6 24 63 24 63 1621 1420.0 41.4 2035 2035 1621 1420.0 33.1 2273 1621 1420.0 37.0 974 1621 1420.0 16.4 976 1621 1420.0 32.8 488 1621 1420.0 35.2 664 1621 1420.0 41.9 1745 1621 1420.0 28.4 1520 1621 1450 1621 1420.0 23.6 20244 1651 2033 1621 STORAGE ELEV FTMSL DISCH KCFS 1420.5 17.2 1420.0 420.0 POWER AVE POWER MW PEAK POW MW 509 128.7 509 538 538 538 509 509 517 ENERGY GWH 1170.6 54.4 98.8 115.1 131.0 141.0 120.0 58.7 29.4 39.8 92.0 85.9 75.8 --FORT RANDALL--NAT INFLOW DEPLETION EVAPORATION 18 8 2304 2304 0 3549 1355.2 37.5 77 117 20788 15 25 2314 2313 12 3 3 2014 2656 -642 2764 4 485 31 24 62 2607 -1 45 34 05 1353.5 43.8 1521 1414 107 2408 2173 0 3549 1355.2 36.5 1242 -65 3705 1289 -320 2443 1122 350 2758 2039 -156 3549 980 374 3132 687 REG INFLOW REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS POWER POWER MI -638 3770 -116 2327 -27 23 01 1337 . 6 43 . 3 1357.7 15.1 1357.0 20.9 1355.2 33.2 1355.2 37.6 1345.0 43.2 1340.1 43.3 1338.1 43.3 1339.4 18.2 AVE POWER MW PEAK POW MW ENERGY GWH 356 208.9 356 220.6 356 233.8 356 234.7 350 245.4 319 240.6 288 286 297 319 339 2046.8 129.4 108.2 48.3 54.4 125.1 103.0 94.4 --GAVINS POINT--NAT INFLOW DEPLETION CHAN STOR 39 -2 2 5 0 2 0 2 625 625 10 38 115 24 -6 10 0 -5 -12 -11 -24 0 2 -5 36 EVAPORATION REG INFLOW RELEASE 2767 2767 22827 1488 2183 2321 2398 2398 2678 1339 $\begin{array}{c} 71\overline{4} \\ 714 \end{array}$ 1537 1230 1150 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -12 354 1206.5 21.0 1206.5 39.0 380 207.5 45.0 -12 342-38 342 207.5 45.0 1207.5 45.0 1207.5 25.0 120 6.0 25.0 1206.0 35.5 206.0 1206.0 1207.5 45.0 1207.5 45.0 1207.5 1206.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 114 61.9 114 84.0 114 84.8 116 82.9 116 86.2 116 19.5 116 22.3 117 65.3 114 48.7 114 82.1 115 85.1 117 52.5 817.0 --GAVINS POINT - SIOUX CITY-NAT INFLOW 3196 1279 DEPLETION 252 22 --CAVINS POINT - STOUX CITY-NAT INFLOW 3196 1279 DEPLETION 252 22 REGULATED FLOW AT SIOUX CITY-KAF 25771 2745 KCFS 46.1 14 36 35 0 3 1 39 36 14 24 11 13 46.3 42.4 25.7 20.4 21.4 44.4 40.9 46.4 46.2 46.2 46.2 46.2 --TOTAL--NAT INFLOW DEPLETION CHAN STOR 610 -83 -163 -9 -63 2 -69 0 -79 -1 2548 102 1502 1105 295 -149 -209 -204 -25 -130 -68 -36 Õ

INI-SUM 30APR

31MAY

30JUN 31JUL

31 AUG

30SEP

310CT

1 5NOV

22 NOV

30NOV

31DEC

31JAN

29 FEB

STUDY NO

TIME OF STUDY 15:01:52 FULL SERV / SHTN NAV SEAS 0 DAYS / PULSE MAY 16.9 (CALC) VALUES IN 1000 AF EXCEPT AS INDICATED AR11 2011 INI-SUM 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB -FORT PECK-219 35 309 553 -245 15579 2237.7 9.0 -108 137 237 446 -209 14988 2234.9 7.5 -90 119 279 369 -90 14899 2234.5 6.0 -80 61 282 553 -272 14502 2232.6 9.0 -24 54 124 179 -55 1484 408 568 3838 -11 25 58 83 -13 28 NAT INFLOW DEPLETION 38 195 405 -69 -55 110 171 553 -382 15197 2235.9 9.0 **EVAPORATION** 417 -21 15782 2238.6 7.0 676 -129 15653 2238.0 11.0 676 -357 14145 2230.9 11.0 66 111 -45 14774 2233.9 7.0 633 MOD INFLOW MOD INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -1948 15803 2238.7 7.4 170 15824 2238.8 9.0 -25 14 819 2234.3 2234.1 POWER AVE POWER MW PEAK POW MW 166 69.7 162 29.5 163 162 18.3 165 166 165 164 163 162 161 160 ENERGY GWH 952.7 111.6 89.5 92.4 92.0 73.9 61.1 13.8 91.0 108.8 101.2 -GARR TSON---52 -20 69 714 1168 -454 18005 -837.2 3 62 -1 07 15 1 60 7 70 11 47 -3 77 1 90 67 1840 .5 19 .3 NAT INFLOW DEPLETION CHAN STOR 524 19 20 15 137 -50 -10 111 -39 -22 -20 493 111 -93 **-**43 -12 -36 4 796 1353 -557 19444 1841.7 22.0 172 229 -57 18518 1838.8 16.5 1187 1353 -166 20000 1843.4 22.0 369 491 -122 18575 1839.0 16.5 -36 660 11191 13274 -2083 19049 1840.5 21.8 262 -59 18459 **EVAPORATION** 1309 472 20166 843.9 22.0 644 1015 -370 18696 1839.4 16.5 893 505 19554 REG INFLOW RELEASE 1199 1381 -588 17417 STOR CHANGE STORAGE 19694 1842.4 19.5 -451 16966 ELEV FTMSL DISCH KCFS 35.2 1842.0 15.0 1838.6 16.5 1833.7 24.0 POWER AVE POWER MW PEAK POW MW ENERGY GWH 491 184.5 499 202.2 498 209.5 483 208.3 479 175.6 475 155.1 474 74.7 473 34.8 472 39.7 467 176.1 460 219.5 2020.0 137.0 -OAHE--10 11 127 962 1361 -399 17516 603.1 22.1 NAT INFLOW DEPLETION CHAN STOR 28 11 18 -21 145 -9 1 28 116 0 $^{14}_{1}$ 173 -10 -10 65 1081 1099 -10 25 -16 1165 2068 -903 18681 1607.0 150 1069 1835 -766 17915 1604.5 30.8 16824 -3431 21093 1614.3 13.9 1250 2072 -822 19584 1609.9 33.7 215 310 -95 17293 1602.4 22.3 EVAPORATION REG INFLOW RELEASE 460 589 -128 17388 1602.7 1105 186 21279 1614.9 18.6 1776 -425 20854 1613.6 28.9 1879 -449 20406 1612.3 31.6 1172 253 17662 258 148 17409 1602.8 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -19 17261 602.3 17.9 1602.3 16.3 1603.6 33.6 19.8 21.1 POWER AVE POWER MW PEAK POW MW 685 208.4 681 47.1 680 167.2 740 733 301.0 720 682 89.7 680 683 197.5 328.4 323.4 178.9 ENERGY GWH 2629.8 179.2 286.5 283.1 39.3 -BIG BEND 2044 2044 1621 1420.0 33.2 1804 1804 1621 1420.0 30.3 1334 1334 1621 1420.0 21.7 576 576 1621 1420.0 19.4 304 1621 1420.0 21.9 1085 1085 1621 1420.0 17.6 EVAPORATION REG INFLOW RELEASE STORAGE 16725 1651 1420.5 17.2 1879 1621 1420.0 31.6 2064 1621 1420.0 33.6 1135 1621 1776 1621 1420.0 28.9 252 1621 1420.0 15.9 ELEV FTMSL DISCH KCFS 1420.0 1420.0 POWER AVE POWER MW PEAK POW MW 509 116.9 509 115.7 538 79.1 529 68.0 509 517 538 538 77.1 509 ENERGY GWH 965.6 63.4 100.6 106.4 103.4 35.0 18.5 15.4 --FORT RANDALL-NAT INFLOW DEPLETION EVAPORATION 15 32 2028 2028 77 4 12 18 10 3 3 1788 1934 -146 3402 2011 -156 3549 1355.2 32.7 274 -26 2295 1337.5 17.3 17637 -649 3770 1357.7 15.1 1331 -65 3705 1357.0 22.4 130 6 194 9 -64 3 275 9 REG INFLOW 1958 887 1 208 2070 0 3549 1355.2 33.7 416 -116 2321 1337.9 30.0 RELEASE STOR CHANGE STORAGE 102 2397 350 2747 374 3121 -322 2437 1355.2 32.9 STORAGE
ELEV FTMSL
DISCH KCFS
POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH 1355.2 1353.5 1345.0 31.7 1340.0 356 206.1 356 199.2 356 206.3 319 188.7 362 1742.5 138.6 356 210.4 350 195.4 296 81.0 293 86.8 319 88.7 339 80.3 287 285 36.8 -GAVINS POINT--NAT INFLOW DEPLETION CHAN STOR 3 24 2 317 317 19 -20 24 0 39 **-**1 2 5 3 2 0 2 10 10 Q -14 EVAPORATION REG INFLOW RELEASE 2035 2035 4.5 2091 13 355 1206.5 34.0 433 2084 2041 2109 20 18 19 93 928 1045 1045 978 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -12 342 1206.0 25.0 380 207.5 33.5 -12 354 1206.0 33.9 1206.0 34.3 1206.0 34.3 1207.5 33.1 1207.5 31.2 1207.5 31.2 1207.5 20.0 1207.5 17.0 1206.5 POWER AVE POWER MW PEAK POW MW ENERGY GWH 114 61.9 115 82.1 117 38.3 117 17.9 $^{117}_{44.7}$ 117 44.7 114 41.5 117 79.8 117 13.5 114 79.6 114 82.2 117 82.5 750.4 81.6 --GAVINS POINT NAT INFLOW DEPLETION - SIOUX CITY-252 22 36 31 39 36 24 11 3 13 14 14 REGULATED FLOW AT SIOUX CITY
KAF 20441 2297
KCFS 38.6 24 68 40 .1 34.0 17.5 18.0 37.3 36.1 35.4 34.6 32.1 32.1 20.9 17.3 --TOTAL--NAT INFLOW DEPLETION CHAN STOR -55 14 -94 -28 2 984 139 981 -161 -104 1141 -49 -75 -66 28 451 55871 -55 -22 -46 427 58846 527 57374 Õ -41 EVAPORATION 61720 60676 5 5 2 4 5 54 952 STORAGE SYSTEM POWER 2369 649.8 21.7 2376 970.9 31.3 1358 1398 2377 2363 977.8 1039.8 32.6 33.5 2332 1027.9 33.2 2269 348.3 23.2 2258 168.8 24.1 2255 150.4 18.8 2256 631.9 20.4 AVE POWER M PEAK POW MW ENERGY GWH 2318 911.2 2296 774.8 25.0 736.4 23.8 673.0 23.2 9061.0 DAILY GWH 30.4

TNT-SUM 30APR

31MAY 30JUN 31JUL 31AUG

30SEP

310CT

15NOV

22 NOV

30NOV

31DEC

31JAN

29 FEB

JDY NO 5

FULLS SERV / NAV SEAS +10 DAYS / NO MAY PULSE VALUES IN 1000 AF EXCEPT AS INDICATED TIME OF STUDY 15:01:22 MAY 31MAR11 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 29FEB INI-SUM 30APR 31MAY -FORT PECK---62 73 413 1107 NAT INFLOW DEPLETION EVAPORATION 240 338 204 23 -129 91 -30 18 15 92 2 60 513 -123 38 -146 $\frac{123}{-16}$ -105 250 -137 15 678 833 1380 18162 2248.7 14.0 270 -140 15538 2237.5 17.0 476 569 16372 2241.2 8.0 922 410 16782 1076 -95 18066 536 -293 15815 2238.7 18.0 738 -258 15280 799 -279 15000 4 38 1070 -632 16740 1107 -633 16108 748 MOD INFLOW RELEASE 9931 STOR CHANGE STORAGE -1013 15803 2238.7 7.4 -694 17372 2245.5 18.0 -211 14 790 ELEV FTMSL DISCH KCFS 2238.1 2243.0 2248.4 17.5 2242.8 18.0 2240.1 POWER AVE POWER MW PEAK POW MW ENERGY GWH 168 79.9 $171 \\ 173 \\ 122.9$ $\substack{\substack{172\\172\\128.2}}$ $^{171}_{170}_{127.3}$ 168 121.8 166 124.3 165 59.6 165 27.7 164 31.6 1302.7 124.9 --GARRISON NAT INFLOW DEPLETION CHAN STOR -117 49 44 1156 1353 -197 19245 1841.1 22.0 17 92 100 - 68 802 10 93 -5 -133 0 -118 -64 -33 27 -96 -10 -6 -53 -55 -63 10 CHAN STOR EVAPORATION REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS POWER 1642 2383 -740 20857 1845.9 40.0 872 1190 -318 19726 1842.5 40.0 1650 1647 407 2380 2045 21908 1848.8 40.0 2958 2460 498 22406 1850.2 40.0 1517 728 19777 1842.7 25.5 23382 -937 19049 1840.5 21.8 -809 21597 1848.0 40.0 -813 20044 1843.5 40.0 -148 19578 1842.1 40.0 -136 19442 1841.7 -646 18599 24 60 198 64 1843.0 1839.1 30.0 40.0 37.5 30.0 POWER MW
PEAK POW MW
ENERGY GWH 504 374.3 502 374.1 500 360.8 503 360.2 498 368.7 492 487 4 61 4 83 88 .4 278 377 481 474 207.1 280.3 81.7 3526.8 232.3 25 9.3 363.5 176.2 -OAHE--10 84 2465 2908 -443 19326 1609.1 47.3 28 0 99 2389 3291 -902 19769 NAT INFLOW DEPLETION CHAN STOR EVAPORATION 5 60 71 -52 18 -32 145 173 1 0 -26 371 -14 10 615 887 -272 18757 2526 3288 -762 21461 2340 3129 -789 20672 1613.1 50.9 1209 1390 -180 19146 1608.5 46.7 27517 -2257 21093 1614.3 13.9 2731 256 22223 1617.5 45.9 28 97 682 -118 19028 1722 -362 18395 REG INFLOW RELEASE 883 21976 STOR CHANGE STORAGE -9 21967 ELEV FTMSL DISCH KCFS POWER 1608.1 1606.1 1606.5 1616.8 1616.8 47.3 1615.4 53.5 1610.4 55.3 1607.3 55.9 AVE POWER MW PEAK POW MW ENERGY GWH 756 471.2 $^{617}_{760}$ $^{444.5}$ 749 523.0 716 454.6 711 700 4336.8 229.1 495.1 505.2 216.5 105.0 132.6 267.3 259.0 233.7 -BIG BEND-27447 27477 1651 1420.5 17.2 3115 3115 1621 1420.0 50.7 3272 3272 1621 420.0 55.0 680 1621 1420.0 49.0 885 1621 1420.0 EVAPORATION REG INFLOW RELEASE 3284 3284 2892 2892 1439 1621 1420.0 24.2 2731 1621 1420.0 45.9 2906 1621 1386 1621 1714 1621 1672 1621 420.0 47.0 STORAGE ELEV FTMSL DISCH KCFS 20.0 1 621 420.0 1420.0 20.0 47.3 53.4 55.8 46.6 26.1 POWER MW AVE POWER MW PEAK POW MW ENERGY GWH 509 17 6.1 440 150.2 440 141.2 517 187.0 538 169.4 538 82.7 538 40.6 538 103.6 538 98.9 529 87.0 79.5 175.6 52.5 1544.3 --FORT RANDALL-NAT INFLOW DEPLETION 15 19 3127 3549 -422 3549 1355.2 57.7 9 12 18 3 2878 3522 -643 2759 1345.0 57.3 **EVAPORATION** 3521 -182 3971 3434 -146 3403 1353.5 57.7 1706 -321 2438 796 -116 2322 1619 102 2398 1349 350 2748 REG INFLOW RELEASE 28936 2743 360 4153 2962 910 1184 1 642 23 3793 STOR CHANGE STORAGE ELEV FTMSL DISCH KCFS -648 3770 1357.7 15.1 -26 22 96 362.0 49.8 60.0 1358.0 1362.0 40.0 57.3 1338.0 1337.5 57.3 1339.3 21.9 POWER AVE POWER MW PEAK POW MW ENERGY GWH 365 2352.3 171.1 375 268.6 375 270.0 370 278.1 354 269.7 349 253.1 317 249.0 294 110.0 285 48.6 293 142.8 339 113.6 --GAVINS POINT NAT INFLOW DEPLETION 10 -1 5 3672 3659 13 355 1206.5 59.5 5 0 5 19 -33 24 -10 2 0 3 0 10 57 39 -5 0 6 14 <u>4</u> 2 -14 2 CHAN STOR -13 24 -24 CHAN STOR EVAPORATION REG INFLOW RELEASE STOR CHANGE STORAGE ELEV FIMSL DISCH KCFS 365 9 365 9 30765 -12 354 1206.5 21.0 35 66 35 41 25 380 1207.5 59.5 2951 3213 3659 1770 944 1783 1476 1381 1904 -12 342 1206.0 32.0 -38 342 1206.0 48.0 1206.0 54.0 1206.0 59.5 38 0 1 207.5 59.5 1207.5 59.5 1207.5 59.5 1207.5 59.5 1207.5 29.0 1207.5 24.0 1206.0 24.0 POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH 117 75.3 117 62.7 110 81.7 115 115 85.2 115 19.2 115 22.0 $\frac{112}{112}$ $\frac{111}{112}$ 849.3 76.3 83.5 79.9 82.4 81.6 41.2 58.1 -GAVINS POINT - SIOUX CITY---GAVINS POINT - SIOUX CITYNAT INFLOW 4014 1524
DEPLETION 252 22
REGULATED FLOW AT SIOUX CITY
KAF 34527 3406
KCFS 57.2 8 4 0 3 6 31 39 36 11 6 3 3 14 24 13 14 29.9 25.7 62.9 9 68 24.6 61.0 61.1 64.6 61.0 61.0 61.0 --TOTAL--NAT INFLOW DEPLETION CHAN STOR EVAPORATION -72 19 35 -6 277 65166 -89 1272 -47 89 -135 0 67 -43 4 95 -1 52 -208 -85 1 -63 0 -202 171 -206 -34 -124 2 Ó 62770 28 9 60238 57319 EVAPORATION
STORAGE
SYSTEM POWER
AVE POWER MW
PEAK POW MW
ENERGY GWH
DAILY GWH 5 6880 58 607 580 34 2384 868.2 28.9 2385 1524.7 49.2 20 97 23 72 1509 .5 50 .3 2350 1451.2 46.8 2300 322.9 46.1 2293 915.7 2313 945.7 30.5 2350 2361 2369 2317 2289 2320 13912.3 1461.9 47.2 1418.8 1561.1 50.4 686.3 45.8 381.6 47.7 864.8 29.5

NWO

From:

Farhat, Jody S NWD02

Sent:

Tuesday, April 05, 2011 12:31 PM

To:

Farmer, Monique L NWO

Subject:

Press release (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Monique - I know you're working on the draft press release, but I wanted to offer my thoughts on the lead since I wasn't too articulate yesterday.

I think the lead should be something along the line of it's going to be another high water year in the Missouri Basin, we already have 5.5 MAF of flood waters stored in the system and more on its way due to melt of the remainder of the plains snowpack and above normal mountain snowpack. And as such, we are beginning to evacuate flood waters at a rate of 10,000 cfs above full service navigation (roughly 2 feet above normal on the lower river) and as a result the spring pulse planned for May will not be implemented.

These are just my thought - I'm sure you can arrange them into coherent sentences the public will understand!

Thanks, Jody

Classification: UNCLASSIFIED

Caveats: NONE

NWO;

From: Sent: To: Subject:	Farhat, Jody S NWD02 Wednesday, April 06, 2011 3:58 PM Engemann, Daniel RE: Gavins Point May Spring Pulse Update (UNCLASSIFIED)				
Classification: UNCLA Caveats: NONE	SSIFIED				
No, December is the correct month. We try to evacuate for the longest period of time at the lowest possible rate to reduce the risk of downstream flood damages. We will be on this higher than normal release schedule through early December.					
Jody					
Original Message From: Engemann, Daniel [mailto:Dan.Engemann@mail.house.gov] Sent: Wednesday, April 06, 2011 3:35 PM To: Farhat, Jody S NWD02 Subject: RE: Gavins Point May Spring Pulse Update (UNCLASSIFIED)					
Jody,					
Question on the floodwater evacuation - you said should last through early December. I'm sure you meant another month. Can you clarify?					
Thanks, Dan Engemann Office of Congressmar 636-239-2276	Blaine Luetkemeyer				
Sent: Wednesday, Apri To: Farhat, Jody S NW Anderson, G Witt NWD; Blechinger, Erik T NW Bryggman, Tim; Castee Christina; Cindy Hall corey dukes@mccaskill Darwin; dayle william NWD02; don canton@hoe Bruce W.; Bierwagen, NWO; Steve; NWD02; harold stones@	NWD02 [mailto:Jody.S.Farhat@usace.army.mil]				

Randy; NWO; Henkle, Richard; richard bender@harkin.senate.gov; Ruch, Robert J

marty boeckel@conrad.senate.gov; NWO; McMahon, John R BG NWD; Roe, Melissa; mike.hayden@outdoorks.com; Matousek, Mike; nathan taylor@tester.senate.gov; nathan vanderplaats@harkin.senate.gov; nichole distefano@mccaskill.senate.gov; Carroll,

Patrick; patrick lehman@johanns.senate.gov; peter henry@blunt.senate.gov; phil erdman@johanns.senate.gov;

NWD02; Mark.Rath@state.sd.us;

NWK;

COL NWO; ryan-flickner@roberts.senate.gov; Schenk, Kathryn M NWO; Corrie, Scott; Seeronen, John R NWD; share-gov; Share-gov; Share-gov; Share-gov; NWK; Share-gov; HQDA; NWD02; Stephen Guertin; stephenne-harding@tester.senate.gov; NWD02; Stephen Guertin; Stephenne-harding@tester.senate.gov; Trace-gov; Trace-gov; Trace-gov; Streeter; Brincks, Wayne; Wayne-NelsonStastny@fws.gov; Wells, Mike MVS External Stakeholder; Westrup, Nathan; zach-nelson@bennelson.senate.gov; Karen Rouse;

<u>Qusace.army.mil</u>
Subject: Gavins Point May Spring Pulse Update (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

All - This is lining up to be another very high runoff year in the Missouri River basin. Over 5.5 million acre feet of floodwater is already stored in the reservoir system and more is on its way due to the melt of the remainder of the plains snowpack and above normal mountain snowpack. As a result we have started to evacuate floodwater at a rate of 10,000 cfs above full service navigation flows. The flood water evacuation is expected to last through early December. The increased releases will result in stages roughly 2 feet above normal in the lower Missouri River basin, but well within the channel.

The higher releases will also prevent implementation of the May spring pulse from Gavins Point Dam to benefit the endangered pallid sturgeon. Flows at Omaha and Nebraska City will be above the flow limits due to the higher releases, essentially closing the window of opportunity to run the spring pulse. The downstream flow limits are safeguards to reduce or eliminate the pulse to ensure that it does not cause flooding of agricultural land along the river during the pulse.

Call or email if you have questions.

Regards, Jody

Jody Farhat, P.E. Chief, Missouri River Basin Water Management

jody.s.farhat@usace.army.mil
Office: 402-996-3840

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Caveats: NONE

NWO

From:

Farmer, Monique L NWO

Sent: Wednesday, April 06, 2011 5:08 PM

To:

Farhat, Jody S NWD02

Subject: FW: Corps cancels May spring pulse, prepares for Annual Operating Plan meetings

(UNCLASSIFIED)

Attachments:

USACE Mainstem Dam System 201103 newsbrief B.pdf

Classification: UNCLASSIFIED

Caveats: NONE

Went out this afternoon just in case you did not see it come through VOCUS.

----Original Message----

From: U.S. Army Corps of Engineers, Northwestern Division [mailto:pradmin@vocus.com]

Sent: Wednesday, April 06, 2011 4:57 PM

To: Farmer, Monique L NWO

Subject: Corps cancels May spring pulse, prepares for Annual Operating Plan meetings

<http://us.vocuspr.com/Publish/520028/vcsPRAsset_520028_348656_c5220867-6ce9-45c0-83c2dfd9e54e58a1_0_USACE_LOGO_small.jpg>

BUILDING STRONG®

NEWS RELEASE

FOR IMMEDIATE RELEASE

Contacts - Monique Farmer (402) 995-2420 Jody Farhat (402) 996-3840

OMAHA, Neb.- Runoff from snow and ice that accumulated during the winter months brought more than double the normal volume of runoff into the Missouri River reservoirs during the month of March, prompting the Corps to begin evacuating surplus water from the system.

"We currently have more than 5.5 million acre feet of floodwater stored in the reservoir system and more on its way due to the melt of the remainder of the plains snowpack and above normal mountain snowpack," said Jody Farhat, Chief of the Water Management Division here. "We have started to evacuate floodwater by increasing releases as tributary flows decline. The increased releases will result in stages roughly 2 feet above normal in the lower Missouri River basin, but well within the channel."

Evacuation of stored floodwater will continue through early December. The higher releases will also prevent implementation of the May spring pulse from Gavins Point Dam to benefit the endangered pallid sturgeon. Flows at Omaha and Nebraska City will be above the flow limits due to the higher releases, essentially closing the window of opportunity to run the spring pulse. The downstream flow limits are safeguards to reduce or eliminate the pulse to ensure that it does not cause flooding of agricultural land along the river during the pulse.

Mountain snowpack is 116 percent above Fort Peck and 112 percent in the reach between Fort Peck and Garrison. Normally, 96 percent of the peak accumulation of mountain snowpack takes place by April 1. Mountain snowpack normally peaks by April 15.

Runoff for 2011 is forecast to total 33.8 MAF, 136 percent of normal. The 2010 total was 38.8 MAF, 156 percent of normal.

During any flood response activities throughout the basin, the Omaha District will provide regular updates directly to the public via its Facebook (www.facebook.com/OmahaUSACE) and Twitter accounts (www.twitter.com/OmahaUSACE).

Missouri River Annual Operating Plan Meetings

A series of six public meetings will take place from April 12-14 to review the 2011 Annual Operating Plan for the Missouri River main stem reservoir system.

There will be presentations on river and reservoir operations that took place this winter, as well as planned operations for the remainder of the year. The meetings will also provide an opportunity for people to ask questions and make comments.

The meeting schedule is as follows:

April 12

- * Nebraska City, Neb. at 11 a.m., Lewis & Clark Center, 100 Valmont Drive
- * Fort Peck, Mont. at 7 p.m., Fort Peck Interpretative Center, Lower Yellowstone Road

April 13

- * Bismarck, N.D., 1 p.m., Radisson Hotel, 605 E. Broadway Ave.
- Pierre, S.D., 7 p.m., Ramkota Hotel, 920 West Sioux Ave.

April 14

- * Jefferson City, Mo., 1 p.m., Hampton Inn at Capital Mall, 4800 Country Club Drive,
- * Kansas City, Mo., 7 p.m. meeting at, Hilton at KCI, 8801 NW 112th Street

Gavins Point releases averaged 21,000 during the month of March. The long-term average for Gavins during this time of year is 19,600. Releases are forecasted to average 25,000 for April. The reservoir will remain near its current elevation of 1206 during April.

Fort Randall reservoir rose 7.2 feet in March, ending the month near elevation 1358. It is expected to drop slightly in April, ending the month near elevation 1357 feet. It is currently 3.3 feet lower than it was last year at this time.

Big Bend reservoir will remain in its normal range of 1420 to 1421 feet. Releases will be adjusted to meet hydropower needs.

Oahe reservoir rose 6.7 feet in March, ending the month at 1614.4 feet. It is expected to climb nearly 2 feet in April, ending the month near elevation 1616. The reservoir's elevation is 0.5 feet higher than it was last year at this time. Oahe releases averaged 13,900 cfs in March.

Garrison reservoir rose 2 feet in March, ending the month at elevation 1840.5. The reservoir will climb more than 3 feet this month ending April near elevation 1844. The reservoir is 2.2 feet higher than it was a year ago at this time. Garrison releases were lowered from 26,000 cfs to 15,000 cfs during March. Releases will remain near 15,000 during the month of April.

Fort Peck rose by 2.9 feet in March, ending the month at elevation 2239.7. It is expected to increase by 1 foot in April, ending the month near elevation 2240. The reservoir is currently 14.5 feet higher than it was a year ago at this time. Fort Peck releases were lowered from 9,000 cfs to 7,000 cfs during March, and will remain at 7,000 cfs during April.

The six main stem power plants generated 630 million kilowatt hours (kWh) of electricity in March. Power plant generation for the month of March was near normal. The total energy production forecast for 2011 anticipates above average production at 11.5 billion kWh. The long-term average is approximately 10 billion kWh.

View daily and forecasted reservoir and river information on the Water Management section of the Northwestern Division homepage at: http://www.nwd-mr.usace.army.mil/rcc.

Other links of interest:

- 1. http://www.nwo.usace.army.mil/html/op-e/flood.html
- www.facebook.com/OmahaUSACE
- www.twitter.com/OmahaUSACE
- 4. www.mraps.org <http://www.mraps.org/>
- 5. www.moriverrecovery.org http://www.moriverrecovery.org/

###

If you would rather not receive future communications from U.S. Army Corps of Engineers, Northwestern Division, let us know by clicking here. U.S. Army Corps of Engineers, Northwestern Division, 1616 Capitol Ave., Ste. 9000, Omaha, NE 68102 United States

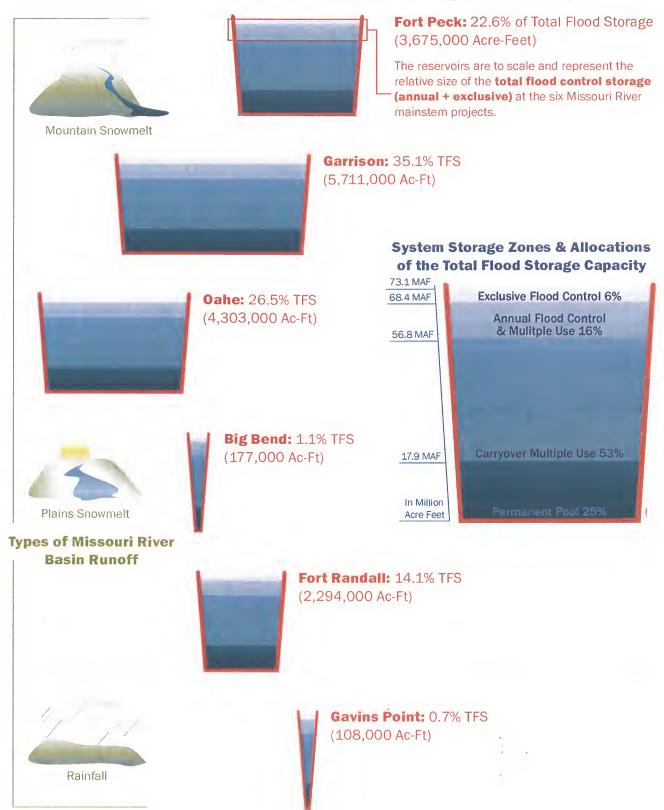
U.S. ARMY CORPS OF ENGINEERS - NORTHWESTERN DIVISION 1616 Capitol Ave., Ste. 9000 http://www.nwo.usace.army.mil/ http://usacearmy.pr-optout.com/Url.aspx?520028x333137x27146 and on Twitter at twitter.com/OmahaUSACE http://usacearmy.pr-optout.com/Url.aspx?520028x333136x361972

<http://us.vocuspr.com/Url.aspx?520028x333145x761158> Like us on Facebook
<http://www.facebook.com/OmahaUSACE> Follow OmahaUSACE <http://www.twitter.com/OmahaUSACE>

Classification: UNCLASSIFIED

Missouri River Mainstem Reservoir System

Flood Control Storage Capacity





NWD

Sent:

Wednesday, April 13, 2011 4:30 PM

To: Cc: Farhat, Jody S NWD02 CENWO-EOC NWO

Subject:

long-term hydrologic forecast for James river? (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Nevermind - I think the AHPS forecasts will work for this requirement. They aren't looking as far out as I thought they were.

Classification: UNCLASSIFIED

Caveats: NONE

Hi Jody/NWO:

I'm in Bismarck ND supporting the state and FEMA during the floods.

FEMA is wanting to conduct a risk/threat analysis - I think they are trying to look out 1-2 weeks and see what communities might be experiencing flooding. My understanding is that the Omaha-portion of ND is in decent shape.

However, are there longer-term hydrologic forecasts for the area that includes how we operate our projects?

US Army Corps of Engineers Northwestern Division - Portland

Civil Emergency Planner

Cell:

Office:

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED



NWD

Sent:

Wednesday, April 13, 2011 2:25 PM

To: Cc: Farhat, Jody S NWD02 CENWO-EOC NWO

Subject:

long-term hydrologic forecast for James river? (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Hi Jody/NWO:

I'm in Bismarck ND supporting the state and FEMA during the floods.

FEMA is wanting to conduct a risk/threat analysis - I think they are trying to look out 1-2 weeks and see what communities might be experiencing flooding. My understanding is that the Omaha-portion of ND is in decent shape.

However, are there longer-term hydrologic forecasts for the area that includes how we operate our projects?

US Army Corps of Engineers Northwestern Division - Portland

Civil Emergency Planner Cell:

Office:

Classification: UNCLASSIFIED

NWO

Sent:

Tuesday, April 12, 2011 4:07 PM

To:

Farhat, Jody S NWD02

Subject:

Offutt Lake Levels (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Jody, I was referred to you by a co-worker. My question concerns MO River elevations through the Aug-Nov2011 timeframe. We have a contractor cleaning the soil on a skeet range in the vicinity of the Base lake, and when the lake is high it backs up into a drainage ditch that goes through the middle of the skeet range. I understand that the lake responds almost immediately to MO River elevations. Could you tell me who I need to talk to who would be able to tell me:

- 1. At what elevation does the Base Lake over flow and flood the skeet range, or more importantly what Mo. river elevation causes this event to occur.
- 2. Is there an immediate hydraulic relationship between the Base Lake and the Mo. river elevations.
- 3. What are the expected River Elevations adjacent to Offutt Base projected throughout the summer?

Answers to these are important as the contractor will have to incur more costs to deal with either damning and diverting the flow through the ditch that runs through the skeet range or remob at a time when the ditch dries up. The contractor will be working the entire month of Aug2011.

Thanks

Classification: UNCLASSIFIED

NWO

From:

Michael Gunsch [mgunsch@houstoneng.com]

Sent:

Tuesday, April 12, 2011 7:41 AM

To:

NWO: Farhat, Jody S NWD02, Odenbach

Cc:

NWO; Gailen Narum (gailen.narum@narumfamily.com); Fleck Terry (tfleck@attitudedr.com); Cary Backstrand; Swenson, Michael A NWD02

Missouri River Releases

Subject:

Jodi:

The Burleigh County Water Resource District is planning to conduct an aerial reconnaissance of the tree snags in the Missouri River below the Heart River Confluence this spring. fly over will be compared to a previous inventory that occurred after the 2009 flood. COE predicted that many of these tree snags would move through on their own over time. Given the high flows this winter and spring there may have been changes, which the BCWRD would like to document before proceeding with the completion of an Environmental Assessment related to the possible removal of some of these trees. This EA has been discussed with the Bismarck Regulatory Office.

The concern we have in conducting this aerial survey are the current high flows and releases. During high flows many of these trees may be below the water line along the edges of the sandbars and more difficult to inventory and remove. Looking at the projected flow releases the COE appears to be planning to increase the Garrison releases shortly after the downstream flows recede. What we would like to know is when the low point in flows at Bismarck is projected to occur. At that time we can coordinate our aerial survey too obtain the best results. We also would like to know what those flows might be.

Your assistance is appreciated. As I am unable to attend the AOP meeting in Bismarck this week, Terry Fleck will be visiting with you regarding this topic and coordination on this effort.

Thanks,

Michael H. Gunsch, PE, Principal / Project Manager

3712 Lockport Street Bismarck, ND 58503 Phone (701) 323-0200 Cell (701) 527-2134 Fax (701) 323-0300

e-mail mgunsch@houstoneng.com<mailto:mgunsch@houstoneng.com>

P Please consider the environment before printing this e-mail This electronic data is transmitted for your convenience. The recipient agrees to indemnify and hold Houston Engineering, Inc. harmless from any liability arising from the use of the data. The recipient further agrees this data will not be transferred or shared with any other party. This electronic data is subject to change and updates are the responsibility of the recipient.

Houston Engineering, Inc. is not responsible for updating the files or for compatibility with recipient's hardware and/or software. Please check this file for virus contamination prior to use.



NEWS RELEASE

For Immediate Release: July 2, 2011

Contact: Monique Farmer - (402) 995-2420 monique.l.farmer@usace.armv.mil

Jody Farhat - (402) 996-3840

Corps cancels May spring pulse, announces Annual Operating Plan meetings

OMAHA, Neb. – Runoff from snow and ice that accumulated during the winter months brought more than double the normal volume of runoff into the Missouri River reservoirs during the month of March, prompting the Corps to begin evacuating surplus water from the system.

"We currently have more than 5.5 million acre feet of floodwater stored in the reservoir system and more on its way due to the melt of the remainder of the plains snowpack and above normal mountain snowpack," said Jody Farhat, Chief of the Water Management Division here. "We have started to evacuate floodwater by increasing releases as tributary flows decline. The increased releases will result in stages roughly 2 feet above normal in the lower Missouri River basin, but well within the channel."

Evacuation of stored floodwater will continue through early December. The higher releases will also prevent implementation of the May spring pulse from Gavins Point Dam to benefit the endangered pallid sturgeon. Flows at Omaha and Nebraska City will be above the flow limits due to the higher releases, essentially closing the window of opportunity to run the spring pulse. The downstream flow limits are safeguards to reduce or eliminate the pulse to ensure that it does not cause flooding of agricultural land along the river during the pulse.

Mountain snowpack is 116 percent above Fort Peck and 112 percent in the reach between Fort Peck and Garrison. Normally, 96 percent of the peak accumulation of mountain snowpack takes place by April 1. Mountain snowpack normally peaks by April 15.

Runoff for 2011 is forecast to total 33.8 MAF, 136 percent of normal. The 2010 total was 38.8 MAF, 156 percent of normal.

During any flood response activities throughout the basin, the Omaha District will provide regular updates directly to the public via its Facebook (www.facebook.com/OmahaUSACE) and Twitter accounts (www.twitter.com/OmahaUSACE).

Missouri River Annual Operating Plan Meetings

A series of six public meetings will take place from April 12-14 to review the 2011 Annual Operating Plan for the Missouri River main stem reservoir system.

-more-

There will be presentations on river and reservoir operations that took place this winter, as well as planned operations for the remainder of the year r. The meetings will also provide an opportunity for people to ask questions and make comments.

The meeting schedule is as follows:

April 12

- Nebraska City, Neb. at 11 a.m., Lewis & Clark Center, 100 Valmont Drive
- Fort Peck, Mont. at 7 p.m., Fort Peck Interpretative Center, Lower Yellowstone Road

April 13

- Bismarck, N.D., 1 p.m., Radisson Hotel, 605 E. Broadway Ave.
- Pierre, S.D., 7 p.m., Ramkota Hotel, 920 West Sioux Ave.

April 14

- Jefferson City, Mo., 1 p.m., Hampton Inn at Capital Mall, 4800 Country Club Drive,
- Kansas City, Mo., 7 p.m. meeting at, Hilton at KCI, 8801 NW 112th Street

Gavins Point releases averaged 21,000 during the month of March. The long-term average for Gavins during this time of year is 19,600. Releases are forecasted to average 25,000 for April. The reservoir will remain near its current elevation of 1206 during April.

Fort Randall reservoir rose 7.2 feet in March, ending the month near elevation 1358. It is expected to drop slightly in April, ending the month near elevation 1357 feet. It is currently 3.3 feet lower than it was last year at this time.

Big Bend reservoir will remain in its normal range of 1420 to 1421 feet. Releases will be adjusted to meet hydropower needs.

Oahe reservoir rose 6.7 feet in March, ending the month at 1614.4 feet. It is expected to climb nearly 2 feet in April, ending the month near elevation 1616. The reservoir's elevation is 0.5 feet higher than it was last year at this time. Oahe releases averaged 13,900 cfs in March.

Garrison reservoir rose 2 feet in March, ending the month at elevation 1840.5. The reservoir will climb more than 3 feet this month ending April near elevation 1844. The reservoir is 2.2 feet higher than it was a year ago at this time. Garrison releases were lowered from 26,000 cfs to 15,000 cfs during March. Releases will remain near 15,000 during the month of April.

Fort Peck rose by 2.9 feet in March, ending the month at elevation 2239.7. It is expected to increase by 1 foot in April, ending the month near elevation 2240. The reservoir is currently 14.5 feet higher than it was a year ago at this time. Fort Peck releases were lowered from 9,000 cfs to 7,000 cfs during March, and will remain at 7,000 cfs during April.

The six main stem power plants generated 630 million kilowatt hours (kWh) of electricity in March. Power plant generation for the month of March was very near normal. The total energy production forecast for 2011 anticipates above average production at 11.5 billion kWh. The long-term average is approximately 10 billion kWh.

View daily and forecasted reservoir and river information on the Water Management section of the Northwestern Division homepage at: http://www.nwd-mr.usace.army.mil/rcc.

Other links of interest:

- http://www.nwo.usace.army.mil/html/op-e/flood.html
- www.facebook.com/OmahaUSACE
- www.twitter.com/OmahaUSACE
- www.mraps.org
- www.moriverrecovery.org

MISSOURI RIVER MAIN STEM RESERVOIR DATA

:	Pool Elev (ft ms		Water in Storage - 1,000 acre-feet			
	On March 31	Change in March	On March 31	% of 1967-2010 Average	Change in March	
Fort Peck	2238.7	+2.9	15,803	113	+627	
Garrison	1840.5	+2.0	19,049	113	+631	
Oahe	1614.4	+6.7	21,093	118	+2,216	
Big Bend	1420.5	-0.2	1,651	96	-11	
Fort Randall	1357.8	+7.2	3,770	100	+602	
Gavins Point	1206.5	+1.0	354	96	+24	
			61,720	113	+4,089	

-more-

WATER RELEASES AND ENERGY GENERATION FOR MARCH

	Average Release in 1,000 cfs	Releases in 1,000 af	Generation in 1,000 MWh
Fort Peck	7.4	455	73
Garrison	21.8	1,342	204
Oahe	13.9	853	134
Big Bend	17.2	1,058	63
Fort Randall	15.1	927	99
Gavins Point	21.0	1,291	57
			630

###

NWO

From:

Sam Johnson [

Sent:

Wednesday, April 06, 2011 5:40 PM

To:

Farhat, Jody S NWD02

Subject:

spring rise

THANK YOU JODY !

Your management has been the best ever.

Sam Johnson

Brunswick ,MO bottom land farmer, some of the most productive land in the world, if we can keep the water off , and have internal drainage.

======

Email scanned by PC Tools - No viruses or spyware found. (Email Guard: 7.0.0.21, Virus/Spyware Database: 6.17260) http://www.pctools.com <http://www.pctools.com/?cclick=EmailFooterClean 51>

======

Sent:

```
Farhat, Jody S NWD02
To:
Subject:
                    Re: Gavins Point May Spring Pulse Update (UNCLASSIFIED)
Ok, thanks.
Dan
---- Original Message -----
From: Farhat, Jody S NWD02 [mailto:Jody.S.Farhat@usace.army.mil]
Sent: Wednesday, April 06, 2011 04:57 PM
To: Engemann, Daniel
Subject: RE: Gavins Point May Spring Pulse Update (UNCLASSIFIED)
Classification: UNCLASSIFIED
Caveats: NONE
No, December is the correct month. We try to evacuate for the longest period of time at the
lowest possible rate to reduce the risk of downstream flood damages. We will be on this
higher than normal release schedule through early December.
Jody
----Original Message----
From: Engemann, Daniel [mailto:Dan.Engemann@mail.house.gov]
Sent: Wednesday, April 06, 2011 3:35 PM
To: Farhat, Jody S NWD02
Subject: RE: Gavins Point May Spring Pulse Update (UNCLASSIFIED)
Jody,
Question on the floodwater evacuation - you said should last through early December. I'm
sure you meant another month. Can you clarify?
Thanks,
Dan Engemann
Office of Congressman Blaine Luetkemeyer
636-239-2276
----Original Message----
From: Farhat, Jody S NWD02 [mailto:Jody.S.Farhat@usace.army.mil]
Sent: Wednesday, April 06, 2011 1:58 PM
To: Farhat, Jody S NWD02; aaron_popelka@moran.senate.gov; Adams, Steve; Feyerherm, Alan;
Blechinger, Erik T NWO; brian klippenstein@blunt.senate.gov; brianne dugan@baucus.senate.gov;
Bryggman, Tim; Casteel, Kelly D.; Ramey, Chad; Charlie Scott; Brown, Chris; Mahoney,
Christina; Cindy_Hall@mccaskill.senate.gov; Brainard, Colin;
corey dukes@mccaskill.senate.gov; d schwietert@thune.senate.gov; Engemann, Daniel; Curls,
Darwin; dayle williamson@bennelson.senate.gov;
Mathisen, Dean; VanMatre, Deb; NWD02; don_canton@hoeven.senate.gov;
         NWO; Elfmann, Edwin; Engelhardt, Bruce W.; Bierwagen, Eric; Bohl, Eric;
erick lutt@bennelson.senate.gov; Farmer, Monique L NWO;
                                                                NWK;
HQ; Garland.Erbele@state.sd.us; Marble, Gary; Gaul, Steve; 🛲
                                                              NWK:
♦ HQ02;
NWD02;
                                           NWD02; harold stones@roberts.senate.gov;
                                           1
```

Engemann, Daniel [Dan.Engemann@mail.house.gov]

Wednesday, April 06, 2011 5:08 PM

Henry Maddux; Hotmann, Anthony J COL NWK; I
Frazier; Mitas, Jim; Jim.Riis@state.sd.us; John Drew; Karen Rouse; Kopocis, Ken; Kneuvean,
Eugene J NWK; NWO; NWO;
NWD02; Mark.Rath@state.sd.us; marty_boeckel@conrad.senate.gov;
NWO; McMahon, John R BG NWD; Roe, Melissa; mike.hayden@outdoorks.com; Matousek, Mike;
nathan_taylor@tester.senate.gov; nathan_vanderplaats@harkin.senate.gov;
<pre>nichole_distefano@mccaskill.senate.gov; Carroll, Patrick; patrick_lehman@johanns.senate.gov;</pre>
NWO; NWK; peter_henry@blunt.senate.gov;
phil_erdman@johanns.senate.gov; NWD; Vogel, Randy; NWO;
Henkle, Richard; richard_bender@harkin.senate.gov; Ruch, Robert J COL NWO;
ryan_flickner@roberts.senate.gov; Schenk, Kathryn M NWO; Corrie, Scott; NWD
shane_goettle@hoeven.senate.gov; sharon_boysen@johnson.senate.gov;
sherry_kuntz@grassley.senate.gov; Management NWK; Management HQDA; Management HQDA;
NWD02; Stephen Guertin; stephenne_harding@tester.senate.gov; NWO; NWO; NWO;
NWD02; NWO; Todd Sando; tracee_sutton@conrad.senate.gov; Tracy
Streeter; Brincks, Wayne; Wayne_NelsonStastny@fws.gov; MVS External Stakeholder;
Westrup, Nathan; zach_nelson@bennelson.senate.gov; Karen Rouse;
@usace.army.mil
Subject: Gavins Point May Spring Pulse Update (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

All - This is lining up to be another very high runoff year in the Missouri River basin. Over 5.5 million acre feet of floodwater is already stored in the reservoir system and more is on its way due to the melt of the remainder of the plains snowpack and above normal mountain snowpack. As a result we have started to evacuate floodwater at a rate of 10,000 cfs above full service navigation flows. The flood water evacuation is expected to last through early December. The increased releases will result in stages roughly 2 feet above normal in the lower Missouri River basin, but well within the channel.

The higher releases will also prevent implementation of the May spring pulse from Gavins Point Dam to benefit the endangered pallid sturgeon. Flows at Omaha and Nebraska City will be above the flow limits due to the higher releases, essentially closing the window of opportunity to run the spring pulse. The downstream flow limits are safeguards to reduce or eliminate the pulse to ensure that it does not cause flooding of agricultural land along the river during the pulse.

Call or email if you have questions.

Regards, Jody

Jody Farhat, P.E. Chief, Missouri River Basin Water Management

jody.s.farhat@usace.army.mil

Office: 402-996-3840

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

NWD02

Sent:

Friday, April 15, 2011 3:29 PM

To:

NWO

Cc:

NWD02; NWD02; NWD02; Farhat, Jody S NWD02;

NWD02;

NWD02

Subject:

RE: Flow Raise Fall 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

September, however, depending on the actual volume we end up getting, there may not be much of a "break". See 1997

----Original Message----

From: NWO

Sent: Friday, April 15, 2011 3:28 PM

To: NWD02

Cc: NWD02; Farhat, Jody S NWD02; Farhat, Jody S NWD02;

NWD02; Summy Kevinia NWD02

Subject: RE: Flow Raise Fall 2011 (UNCLASSIFIED)

I guess the question would be, when does the break from summer flow (39k) to Sep flow of 45k occur? Every foot or two of depth will help the Contractor.

----Original Message----From: NWD02

Sent: Friday, April 15, 2011 2:39 PM

To: NWO

Cc: NWD02; MD02; MD02; MD02; MD02; Farhat, Jody S NWD02; MD02; MD0

NWD02; MWD02

Subject: RE: Flow Raise Fall 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

We are in the process of evacuating flood water from the reservoir system as downstream conditions permit by increasing the service level above full service. The current April 1 forecast shows 39 KCFS through the summer then 45KCFS in September through early December. We are continually evaluating the service level needed to evacuate the stored water from the system and could make another increase as early as next week. I suspect the May 1 forecast will show an even higher service level. Bottom line is, I do not anticipate "lower flows" anytime this summer. I suspect we could be in the low to mid 40's this summer starting in May and maybe low 50's this fall. The May 1 forecast will have better numbers. I hope this helps!

----Original Message----

From: NWC

Sent: Friday, April 15, 2011 6:46 AM

To: NWD02; NWD02; NWD02;

NWD02

Cc: NWO; NWO; NWO;

Subject: Flow Raise Fall 2011

Does RCC have a firm or best available date for when flows will start to raise in fall 2011?

In the ESH construction contract awards this summer, the COE is considering to request the NPS to allow moving the fall starting date for working in the Rec River forward, as early as mid August or even late July. The intent is to allow the Contractor several weeks of sandbar construction in lower flows, get in a solid base or perhaps flow shield / deflector, to facilitate bar placement once the flows are raised.

Can RCC provide, within the next few days, the best available date of when the fall flow raise will occur for use with NPS negotiations? What is the accuracy of the estimated date?

----Original Message----NWO From:

Sent: Thursday, April 14, 2011 4:13 PM

NWO:

Cc: Svendsen, Christopher J NWO; Crane, Kelly A NWO

Subject: RE: Near term construction awards (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Please check. I don't think it hurts even if it doesn't give us any extended season this year...I think any time we can get the NPS to give us is a reason to celebrate! Thanks,

----Original Message----

Sent: Thursday, April 14, 2011 2:40 PM

NWO;

NWO

Subject: Re: Near term construction awards (UNCLASSIFIED)

We could check with RCC but I don't think 15 aug gets us any low flow construction.

---- Original Message -----

From: NWO; To:

NWO

NWO Sent: Thu Apr 14 12:20:56 2011

Subject: RE: Near term construction awards (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

I jumped in on a discussion with Gia Wagner and TJ Davey yesterday morning at the ESH PDT. We suggested 15 July and got a little pushback, but she seemed definitely open to moving up from the Labor Day usual start. I think if we suggested 10-15 August we would have a good chance of getting support. July 15th or thereabouts, I'm less confident we will get support. If we need it because of the flows, I think we might want to send a detailed letter explaining why.

PB

----Original Message----

From: NWO

Sent: Thursday, April 14, 2011 2:13 PM

To: NWO

Cc: NWO; NWO

Subject: Near term construction awards

Talking with the and the prior of the NPS being willing to discuss a modification to the construction window came up. I noticed that RCC has bumped the basic releases by 4k since our meeting. It occurred to me, prior to awarding these contracts, can we ask NPS to move the fall date forward by about 3 or 4 weeks, maybe shoot for 20 July or similar? This would allow the Contractor to mobilize and start a base before the flows start to raise. Just one more idea for ways to possibly get some habitat in the difficult construction environment forecast for the fall.

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

NWO NWO

From:

Sent: Friday, April 15, 2011 3:28 PM

To: NWD02

Cc: NWD02; Farhat, Jody S NWD02;

Subject: NWD02; NWD02 RE: Flow Raise Fall 2011 (UNCLASSIFIED)

I guess the question would be, when does the break from summer flow (39k) to Sep flow of 45k occur? Every foot or two of depth will help the Contractor.

----Original Message----

From: NWD02

Sent: Friday, April 15, 2011 2:39 PM

To: NWO

Cc: NWD02; Farhat, Jody S NWD02;

NWD02; Stamm, Kevin D NWD02

Subject: RE: Flow Raise Fall 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

We are in the process of evacuating flood water from the reservoir system as downstream conditions permit by increasing the service level above full service. The current April 1 forecast shows 39 KCFS through the summer then 45KCFS in September through early December. We are continually evaluating the service level needed to evacuate the stored water from the system and could make another increase as early as next week. I suspect the May 1 forecast will show an even higher service level. Bottom line is, I do not anticipate "lower flows" anytime this summer. I suspect we could be in the low to mid 40's this summer starting in May and maybe low 50's this fall. The May 1 forecast will have better numbers. I hope this helps! Doug

----Original Message----

From: NWO

Sent: Friday, April 15, 2011 6:46 AM

To: NWD02; NWD02; NWD02; NWD02; NWD02; NWD02

Cc: NWO; NWO; NWO

Subject: Flow Raise Fall 2011

Does RCC have a firm or best available date for when flows will start to raise in fall 2011?

In the ESH construction contract awards this summer, the COE is considering to request the NPS to allow moving the fall starting date for working in the Rec River forward, as early as mid August or even late July. The intent is to allow the Contractor several weeks of sandbar construction in lower flows, get in a solid base or perhaps flow shield / deflector, to facilitate bar placement once the flows are raised.

Can RCC provide, within the next few days, the best available date of when the fall flow raise will occur for use with NPS negotiations? What is the accuracy of the estimated date?

----Original Message----From: NWO Sent: Thursday, April 14, 2011 4:13 PM NWO; NWO Cc: S NWO; Subject: RE: Near term construction awards (UNCLASSIFIED) Classification: UNCLASSIFIED Caveats: NONE Please check. I don't think it hurts even if it doesn't give us any extended season this

year...I think any time we can get the NPS to give us is a reason to celebrate! Thanks,

----Original Message----NWO

Sent: Thursday, April 14, 2011 2:40 PM To: NWO; Cc: 5 NWO

Subject: Re: Near term construction awards (UNCLASSIFIED)

We could check with RCC but I don't think 15 aug gets us any low flow construction.

---- Original Message -----From: NWO NWO; NWO To: NWO

Sent: Thu Apr 14 12:20:56 2011

Subject: RE: Near term construction awards (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

I jumped in on a discussion with Gia Wagner and TJ Davey yesterday morning at the ESH PDT. We suggested 15 July and got a little pushback, but she seemed definitely open to moving up from the Labor Day usual start. I think if we suggested 10-15 August we would have a good chance of getting support. July 15th or thereabouts, I'm less confident we will get support. If we need it because of the flows, I think we might want to send a detailed letter explaining why.

PB

----Original Message----From: NWO

Sent: Thursday, April 14, 2011 2:13 PM

NWO

NWO;

Subject: Near term construction awards

Talking with and and the topic of the NPS being willing to discuss a modification to the construction window came up. I noticed that RCC has bumped the basic releases by 4k since our meeting. It occurred to me, prior to awarding these contracts, can we ask NPS to move the fall date forward by about 3 or 4 weeks, maybe shoot for 20 July or similar? This would allow the Contractor to mobilize and start a base before the flows start to raise. Just one more idea for ways to possibly get some habitat in the difficult construction environment forecast for the fall.

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

NWO

From:

NWD02

Sent:

Friday, April 15, 2011 2:39 PM

To: Cc: NWO NWD02;

NWD02; Farhat, Jody S NWD02;

Subject:

RE: Flow Raise Fall 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

We are in the process of evacuating flood water from the reservoir system as downstream conditions permit by increasing the service level above full service. The current April 1 forecast shows 39 KCFS through the summer then 45KCFS in September through early December. We

are continually evaluating the service level needed to evacuate the stored water from the system and could make another increase as early as next week. I suspect the May 1 forecast will show an even higher service level. Bottom line is, I do not anticipate "lower flows" anytime this summer. I suspect we could be in the low to mid 40's this summer starting in May

and maybe low 50's this fall. The May 1 forecast will have better numbers. I hope this helps!

----Original Message----

From: NWO

Sent: Friday, April 15, 2011 6:46 AM

To: NWD02; NWD02;

NWD02

Cc: NWO; NWO; NWO;

Subject: Flow Raise Fall 2011

Does RCC have a firm or best available date for when flows will start to raise in fall 2011?

In the ESH construction contract awards this summer, the COE is considering to request the NPS to allow moving the fall starting date for working in the Rec River forward, as early as mid August or even late July. The intent is to allow the Contractor several weeks of sandbar construction in lower flows, get in a solid base or perhaps flow shield / deflector, to facilitate bar placement once the flows are raised.

Can RCC provide, within the next few days, the best available date of when the fall flow raise will occur for use with NPS negotiations? What is the accuracy of the estimated date?

----Original Message----

From: NWO

Sent: Thursday, April 14, 2011 4:13 PM

To: NWO;

NWO; NWO

Subject: RE: Near term construction awards (UNCLASSIFIED)

Classification: UNCLASSIFIED

Please check. I don't think it hurts even if it doesn't give us any extended season this year...I think any time we can get the NPS to give us is a reason to celebrate! Thanks,

----Original Message----

Sent: Thursday, April 14, 2011 2:40 PM
To: NWO; NWO; NWO

Cc: NWO

Subject: Re: Near term construction awards (UNCLASSIFIED)

We could check with RCC but I don't think 15 aug gets us any low flow construction.

---- Original Message -----

From: NWO NWO; NWO;

Cc: NWO Sent: Thu Apr 14 12:20:56 2011

Subject: RE: Near term construction awards (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

I jumped in on a discussion with Gia Wagner and TJ Davey yesterday morning at the ESH PDT. We suggested 15 July and got a little pushback, but she seemed definitely open to moving up from the Labor Day usual start. I think if we suggested 10-15 August we would have a good chance of getting support. July 15th or thereabouts, I'm less confident we will get support. If we need it because of the flows, I think we might want to send a detailed letter explaining why.

PB

----Original Message-----

Sent: Thursday, April 14, 2011 2:13 PM

To: NWO

Cc: NWO; NWO

Subject: Near term construction awards

Talking with the topic of the NPS being willing to discuss a modification to the construction window came up. I noticed that RCC has bumped the basic releases by 4k since our meeting. It occurred to me, prior to awarding these contracts, can we ask NPS to move the fall date forward by about 3 or 4 weeks, maybe shoot for 20 July or similar? This would allow the Contractor to mobilize and start a base before the flows start to raise. Just one more idea for ways to possibly get some habitat in the difficult construction environment forecast for the fall.

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

NWD02

Sent:

Friday, April 15, 2011 12:55 PM

To: Subject:

Farhat, Jody S NWD02; NWD02 NWD02 FW: AOP meeting Jeff City Apr 14 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

FYI.

Reservoir Regulation Team Lead Missouri River Basin Water Management, Northwestern Division, USACE

(fax)

----Original Message----

----Oi iginal Message----

Sent: Friday, April 15, 2011 12:48 PM

To: NWD02

Subject: AOP meeting Jeff City Apr 14 2011

Thank everyone for the program yesterday. It was very informative. May I suggest some changes in the slides to help landowners have a better grasp of water runoff and river operations. ---1---A) Slide 7 is great. B) Slide 8 needs to have "% Runoff Controlled" inserted above the headings "Plains Snowpack", Mountain Snowpack" and "Rainfall". I am assuming that the runoff indicted is basin wide. You decide if the "% Runoff Controlled" needs to be for the current year or for system design. C) Slide 9 is great. The basin boundary line indicates what runoff is controlled and not controlled. Slide 9 needs to be followed with an additional slide with a single map showing more states. E) Slide 15 is the most helpful for what runoff can be controlled and Slide 10 is great. what runoff cannot be controlled. It would be nice if runoff percentages for Nebraska City, Kansas City, Boonville and Hermann could be shown too. Below Gavins Point it would be nice to show percent runoff controlled and percent not controlled. The state lines need to be darker too. F) Slide 30 is very helpful too. May I suggest that river stage needs to be indicated for the different discharge rates. The rates and river stage need to be indicated for Boonville and Hermann too. From experience, cfs discharge rates are ineffective for the public's understanding of how they relate to water levels in the river for flap gate closures, bank full flows and levee overtopping situations. In every instance information that relates to water depth or stage provides a better understanding of river operations. ----2--- Individual slides that I can readily use are: 7, 8 edited, 9, with an additional one showing more states, 10, 15 edited, 30 edited and 31. I want to use them in presentations to landowners of levee districts. Thank you, JBG, PE

Joseph B. Gibbs, PE, Columbia, Missouri 65203

Classification: UNCLASSIFIED

NWD02

Sent:

Friday, April 15, 2011 2:14 PM

To: Subject:

Farhat, Jody S NWD02; NWD02 FW: River stage from Gavins Point (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

More FYI.

Reservoir Regulation Team Lead Missouri River Basin Water Management, Northwestern Division, USACE

(fax)

----Original Message----

From: Sent: Friday, April 15, 2011 1:20 PM

To: NWD02

Subject: River stage from Gavins Point

The other subject that we talked about yesterday was trying to indicate the depth of water in the river attributable to discharges from reservoir control dams. Water depths in feet attributable to such discharges at only the flow measuring stations along the river would be sufficient. This would indicate a clearer more truthful picture of river operations to landowners, levee districts, news media reporters and individuals. These people do not think in term of cfs or percentages of flow at a particular place along the river. They think in terms of river stage and forecasts they hear from the news media. Where to put this information is up to you. May I suggest that it be included with the river stage and forecast information on the USACE web site. Regards, JBG, PE

🌉 , Columbia, Missouri 65203 Ph 📆

Joseph B. Gibbs, PE,

Caveats: NONE

1

NWO

From:

NWD02

Sent:

Friday, April 15, 2011 10:32 AM

To: Cc: Farhat, Jody S NWD02 NWD02

Subject:

FW: Key Points from AOP Meetings (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Kevin's bullets are below, my additions are:

Nebraska City:

- A couple of comments regarding interior drainage at the higher flows

Fort Peck:

- Status of gage program

Bismarck:

- discussion of tern/plover habit and construction

- status of MRAPS

----Original Message----

From:

NWD02

Sent: Friday, April 15, 2011 9:23 AM

NWD02

Cc: Farhat, Jody S NWD02

Subject: Key Points from AOP Meetings (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Please edit/add to as necessary from your notes and then forward to Jody.

Nebraska City - nothing.

Fort Peck:

- please consider shaping flood water evacuation to benefit d/s F&W, specifically regarding use of warmer spill water.
- please coordinate regarding timing and magnitude of spillway flows
- the corps and upper states will be coordinating regarding unbalancing criteria for the 2011-2012 AOP
- our office will work with irrigators throughout the season regarding releases so that their pumps stay operational throughout the entire day

Bismarck:

- while it's important to note that we've seen water in the exclusive zone last year and perhaps this year at Garrison, just a couple years ago this project was at its historical That being said, we are concerned that we will be in exclusive again this year
- concerned about the corps' position on easements, water storage contracts, do not agree that we should be paying for our water
- we must remain vigilant about drought conditions that may return to the basin

- need to add a flood damages prevented slide to the spring presentation
- after HQ makes their decision regarding the water supply contract, we request that there be a public meeting in ND
- concerns that the high releases from Garrison for flood evacuation will affect the planned work on bird habitat on sandbars
- need to coordinate with folks when and where we plan to do the sandbar veg-clearing work this summer

Pierre:

- water control plans must consider next drought it's not if, it's when the next one occurs
- water conservation measures should be implemented as soon as possible when the flood evacuation (wet) period ends
- concerned about sediment in reservoirs and river reaches as how it affects F&W
- government needs to address sediment issues caused by the construction of the projects ... benefits of projects are slowly eroding as reservoirs continue to fill up with sediment
- AOP must define what/how sediment will affect reservoir management
- FWS is looking to the Corps to come up with a plan for reservoir unbalancing
- Corps needs to validate d/s flood control constraints as it applies to the bi-modal spring
- do not agree with the decision to charge us for our water (Garrison water supply)

Jefferson City:

- "full service flows" is different than providing flow to ensure the authorized (300'x9') navigation channel
- in order to ensure a growing navigation industry, Corps needs to provide full service for entire season and consider a longer navigation season
- navigation and flood control should be a larger focal point of the presentation
- corps should consider starting the navigation season earlier
- concerns about the FY11 budget and FY12/13 budgets as they apply to maintaining the navigation channel
- please report to corps upper leadership regarding the need to maintain funding for navigation channel maintenance
- div and dist commanders need to better emphasize the need for continued support of navigation during their quarterly congressional visits

Kansas City:

- AOP states that utilities, due to channel degradation, need to take appropriate measures to address changing river conditions ... it also needs to address how studies need to done to understand what measures have been taken and need to be taken to address the degradation issue
- the d/s flow limits need to be re-examined to see if they're a good fit with what is trying to be done regarding F&W and flood control, especially with the bi-modal spring pulse



Reservoir Regulation Team Lead Missouri River Basin Water Management, Northwestern Division, USACE



Classification: UNCLASSIFIED

Sent:

William Lay [Line 12] Friday, April 15, 2011 9:45 AM

To:

Farhat, Jody S NWD02

Subject:

AOP

Dear Jody,

I appreciate the 10,000 extra releases, when we are faced with a full reservoir and are looking forward to a high water year while we are staying within flood It looks like that four months of those releases through the end of control constraints. June, might give us a quarter of a million acre feet of extra storage in the lower reservoirs. That is where I like the storage to be.

It is a little scary to see the annual flood control pool being half full this early in the year. We have a lot more water to come before the end of July.

The fellows like Dave Pope need to realize we get high flows, even though the flood control constraints would appear to keep the flows low. Last year there were many months where you weren't able to stay within all of the constraints. He is not the only one.

I wish I had a job where I could fly around the basin. I would have wanted to have had a little better weather than you had last night.

Bill Lay

NWD02

Sent:

Friday, April 15, 2011 9:23 AM NWD02

To: Cc:

Farhat, Jody S NWD02

Subject:

Key Points from AOP Meetings (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE



Please edit/add to as necessary from your notes and then forward to Jody.

Nebraska City - nothing.

Fort Peck:

- please consider shaping flood water evacuation to benefit d/s F&W, specifically regarding use of warmer spill water.
- please coordinate regarding timing and magnitude of spillway flows
- the corps and upper states will be coordinating regarding unbalancing criteria for the 2011-2012 AOP
- our office will work with irrigators throughout the season regarding releases so that their pumps stay operational throughout the entire day

Bismarck:

- while it's important to note that we've seen water in the exclusive zone last year and perhaps this year at Garrison, just a couple years ago this project was at its historical low. That being said, we are concerned that we will be in exclusive again this year
- concerned about the corps' position on easements, water storage contracts, do not agree that we should be paying for our water
- we must remain vigilant about drought conditions that may return to the basin
- need to add a flood damages prevented slide to the spring presentation
- after HQ makes their decision regarding the water supply contract, we request that there be a public meeting in ND
- concerns that the high releases from Garrison for flood evacuation will affect the planned work on bird habitat on sandbars
- need to coordinate with folks when and where we plan to do the sandbar veg-clearing work this summer

Pierre:

- water control plans must consider next drought it's not if, it's when the next one occurs
- water conservation measures should be implemented as soon as possible when the flood evacuation (wet) period ends
- concerned about sediment in reservoirs and river reaches as how it affects F&W
- government needs to address sediment issues caused by the construction of the projects \dots benefits of projects are slowly eroding as reservoirs continue to fill up with sediment
- AOP must define what/how sediment will affect reservoir management
- FWS is looking to the Corps to come up with a plan for reservoir unbalancing
- Corps needs to validate d/s flood control constraints as it applies to the bi-modal spring pulse
- do not agree with the decision to charge us for our water (Garrison water supply)

Jefferson City:

- "full service flows" is different than providing flow to ensure the authorized (300'x9') navigation channel
- in order to ensure a growing navigation industry, Corps needs to provide full service for entire season and consider a longer navigation season
- navigation and flood control should be a larger focal point of the presentation
- corps should consider starting the navigation season earlier
- concerns about the FY11 budget and FY12/13 budgets as they apply to maintaining the navigation channel
- please report to corps upper leadership regarding the need to maintain funding for navigation channel maintenance
- div and dist commanders need to better emphasize the need for continued support of navigation during their quarterly congressional visits

Kansas City:

- AOP states that utilities, due to channel degradation, need to take appropriate measures to address changing river conditions ... it also needs to address how studies need to done to understand what measures have been taken and need to be taken to address the degradation issue
- the d/s flow limits need to be re-examined to see if they're a good fit with what is trying to be done regarding F&W and flood control, especially with the bi-modal spring pulse

Reservoir Regulation Team Lead Missouri River Basin Water Management, Northwestern Division, USACE

(fax)

Classification: UNCLASSIFIED



From: ■ NWO

Thursday, April 14, 2011 8:05 AM Sent:

NWD To:

NWO: 🖷 NWO: 🕷 NWO: Cc: MNWO; Farhat, Jody S NWD02; 🖿 NWO.

FW: Jamestown/Pipestem Reservoir Releases - 13 April 2011 (UNCLASSIFIED) Subject:

Attachments: Jamestown-Pipestem Releases2011.xlsx

Classification: UNCLASSIFIED

Caveats: NONE

Ms Change

At the present time the only flood threat that the Omaha District is tracking in North Dakota is on the James River, and specifically in Jamestown and Stutsman County. Below is a summary of the recent reservoir operations at Jamestown. I have asked my staff to include you on all future correspondence.

The POC for this work in Brian Twombly. If you have any questions please contact him. Brian's contact information is below.

Jahr I. Remos II, P.E. Chief, Hydrologic Engineering Branch Omaha District 1616 Capital Avenue, Suite 9000 Omaha, Nebraska 68102 🤛 (work) (cell) (fax) **■**@usace.army.mil

----Original Message----From: NWO Sent: Wednesday, April 13, 2011 4:27 PM NWO; NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'jfuchs@daktel.com'; 'dave azure@fws.gov'; 'William Schultze@fws.gov'; 'Kim Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov'; 'Harris_Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us'; 'cr.krf@noaa.gov'; 'bcem@brown.sd.us'; 'sad_h@hotmail.com'; 'todvolk@nd.gov' 🚆 NWO; 👣 NWO; Th NWO; NWO; NWO; NWO; ■ NWO; ■ NWO; NWO; NWO: NWO; 🖫 NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWO; F NWO: NWO; 🖣 HQ02@NWO; (Subject: Jamestown/Pipestem Reservoir Releases - 13 April 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Releases were increased from 700 cfs to 900 cfs at Jamestown Reservoir at 16:00 hours today. Pipestem Reservoir releases were held at 400 cfs. The combined release is 1300 cfs. Flows at the James River at Jamestown gage are currently at 1,010 cfs and rising from this morning's releases.

Currently Jamestown Reservoir is at elevation 1438.1 ft with an inflow of about 3500 cfs. About 9% of the flood pool is occupied. Inflows are continuing to rise. Pipestem reservoir is at 1472.7 ft with over 36% of the flood pool occupied and inflows near 3,200 cfs. Inflows appear to have peaked at Pipestem, but they are staying high.

Let me know if you have any questions.

US Army Corps of Engineers
Water Control and Water Quality Section
Hydraulic Engineer

@usace.army.mil

----Original Message----From: NWO Sent: Wednesday, April 13, 2011 10:42 AM NWO; NWO; NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'jfuchs@daktel.com'; 'dave_azure@fws.gov'; 'William_Schultze@fws.gov'; 'Kim_Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov'; 'Harris Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us'; 'cr.krf@noaa.gov'; 'bcem@brown.sd.us'; 'sad_h@hotmail.com'; 'todvolk@nd.gov' NWO; The NWO; 9 NWO: NWO; NWO; NWO; NWO; NWO; NWO; NWO; NWO: NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWO; NWO: NWO; INVO ■ HQ02@NWO; ■ Subject: Jamestown/Pipestem Reservoir Releases - 13 April 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Releases from Jamestown Reservoir were increased from 500 cfs to 700 cfs this morning at 9:45 hours. Pipestem Reservoir releases were increased from 200 cfs to 400 cfs at 9:00 hour this morning. The combined release is now 1100 cfs. The James River at Jamestown is currently at a flow of 800 cfs; once this morning's release water reaches the gage, it should be at a flow of 1200 cfs.

Currently Jamestown Reservoir is at elevation 1437.1 ft with an inflow of about 3500 cfs. About 9% of the flood pool is occupied. Inflows are continuing to rise. Pipestem reservoir is at 1472.3 ft with over 36% of the flood pool occupied and inflows near 3,200 cfs. Inflows appear to have peaked at Pipestem, but they are staying high.

Plans are underway to go up another 200 cfs this afternoon at Jamestown Reservoir which will be a release of 900 cfs. Previously we projected the maximum release to be in the 1200 to 1800 cfs range. With the high inflows into both reservoirs, combined releases will be in the upper end of that range at 1800 cfs. All releases will be coordinated with the City of Jamestown.

We will have a conference call today at 13:00 hours. The call information is below:

Call in number (866)804-5152
Participant passcode

Let me know if you have any questions.

----Original Message----NWO Sent: Tuesday, April 12, 2011 3:57 PM NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; NWO: 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'jfuchs@daktel.com'; 'dave azure@fws.gov'; 'William Schultze@fws.gov'; 'Kim_Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov'; 'Harris_Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us'; 'cr.krf@noaa.gov'; 'bcem@brown.sd.us'; 'sad_h@hotmail.com' NWO; NWO; Cc: N NWO; NWO; NWO; NWO; NWO; NWO; NWO; NWO; YOURS NWO: NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWQ; NWO; ■ HQ02@NWO; t NWO

Subject: Jamestown/Pipestem Reservoir Releases - 12 April 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Releases from Jamestown Reservoir were increased from 300 cfs to 500 cfs today at 15:00 hours. Pipestem Reservoir releases remain unchanged at 200 cfs. The combined release is now 700 cfs. The James River at Jamestown is currently at a flow of 580 cfs and the water from the morning release is just getting to the gage.

Currently Jamestown Reservoir is at elevation 1435.8 ft with an inflow of about 1700 cfs. Slightly over 5% of the flood pool is occupied. Inflows are continuing to rise. Pipestem reservoir is at 1470.6 ft with over 32% of the flood pool occupied and inflows near 3,700 cfs. Inflows appear to have peaked at Pipestem.

Tomorrow, we are planning to make similar releases as today by going up 200 cfs in the morning and afternoon at Jamestown Reservoir. The plan is to leave Pipestem at 200 cfs tomorrow. All releases will be coordinated with the City of Jamestown.

US Army Corps of Engineers
Water Control and Water Quality Section
Hydraulic Engineer

@usace.army.mil

----Original Message-----OWN From: Sent: Tuesday, April 12, 2011 10:58 AM To: Twombly, Brian J NWO; Temeyer, Timothy E NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'ifuchs@daktel.com'; 'dave azure@fws.gov'; 'William_Schultze@fws.gov'; 'Kim_Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov'; 'Harris_Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us' NWO; NWO; NWO; NWO; 🖫 NWO; 🕽 NWO; 🖣 NWO; 🖣 🛡 NWO; 🦸 NWO; NWO; NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWO; ■ NWO; ▶ HO02@NWO: t NWO Subject: RE: Jamestown/Pipestem Reservoir Releases - 11 April 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Releases from Jamestown Reservoir were increased by 200 cfs this morning at 10:00 hours to a total of 300 cfs. Pipestem Reservoir releases remain at 200 cfs. The combined release is 500 cfs. The current flow at the James River at Jamestown gage is 440 cfs, but this morning's releases have not reached the gage yet.

Currently Jamestown Reservoir is at elevation 1435.4 ft with an inflow of about 1700 cfs. Slightly over 5% of the flood pool is occupied. The USGS got flow measurements of 10,400 cfs at Grace City and 6,500 cfs at Kensal yesterday, so Jamestown inflows are expected to continue rising. There is about a 2 day travel time between the Kensal gage and Jamestown Reservoir. Pipestem reservoir is at 1470.1 ft with over 32% of the flood pool occupied and inflows near 3,700 cfs. Inflows appear to have peaked at Pipestem.

The next potential release is to go up again this afternoon by 100 cfs at Jamestown Reservoir. All releases will be coordinated with the City of Jamestown. If we make this release this afternoon it will be more aggressive than the 100 to 200 cfs that we put in yesterday's press release. We will still gradually step up releases, but would like to say aggressive with the high inflows. If you have any questions or concerns feel free to contact myself or Tim Temeyer.

We will also have a conference call tomorrow at 13:00 hours. Call information is below:

Call in number (866)804-5152
Participant passcode

US Army Corps of Engineers

Water Control and Water Quality Section
Hydraulic Engineer

@usace.army.mil

----Original Message----From: Sent: Monday, April 11, 2011 3:09 PM To: Twombly, Brian J NWO; Temeyer, Timothy E NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'jfuchs@daktel.com'; 'dave_azure@fws.gov'; 'William_Schultze@fws.gov'; 'Kim Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov'; 'Harris Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us' NWO; ¶ Cc: 1 NWO; NWO; NWO; NWO; NWO; ■ NWO; NWO; NWO; NWO; 📹 NWO; NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWO; NWO; ➡ HQ02@NWO; NWO

Subject: Jamestown/Pipestem Reservoir Releases - 11 April 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Pipestem Reservoir releases were increased today at 10:30 hours from 100 cfs to 200 cfs. Jamestown Reservoir releases were increased from 13 cfs to 100 cfs today at 14:15 hours. The combined releases are now 300 cfs. The current flow at the Jamestown gage is 300 cfs, but none of the release water has made it to the gage yet. Once the releases reach the gage, flows should be near 500 cfs.

Currently Jamestown Reservoir is at elevation 1434.2 ft with an inflow of over 1000 cfs. Under 5% of the flood pool is occupied. Flows have really been picking up at the James River near Grace City gage, so inflows to Jamestown Reservoir are expected to continue to increase. Pipestem reservoir is at 1467.8 ft with over 27% of the flood pool occupied and inflows of over 4,000 cfs. The Pipestem Creek at Pingree gage appears to have peaked on April 9, but flows are staying high. Attached is the current pool plot with the forecasts for each reservoir and the 1997, 2009, and 2010 pool plots.

Release plans are to go up another 100 cfs at Pipestem in the morning and 100 cfs at Jamestown in the afternoon. All releases will be coordinated with the City of Jamestown.

There will be a Jamestown/Pipestem Reservoir conference call on Wednesday, April 13 at 13:00 hours to discuss current conditions. Conference call number is as follows:

Let me know if you have any questions.

US Army Corps of Engineers Water Control and Water Quality Section Hydraulic Engineer

```
----Original Message----
         NWO
Sent: Sunday, April 10, 2011 4:17 PM
To: Temeyer, Timothy E NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov';
'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson';
'jfuchs@daktel.com'; 'dave_azure@fws.gov'; 'William_Schultze@fws.gov'; 'Kim_Hanson@fws.gov';
'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov';
'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L';
'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)';
'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov';
'Harris Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov';
'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us'
                                                         NWO;
            NWO;
                                  NWO;
Cc:
NWO;
                 NWO;
                                    NWO;
                                                           NWO:
               NWO;
                                   NWO;
                                                         NWO; 1
                                                                             NWO;
                                 NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWO;
              NWO;
            HQ02@NWO;
                                 NWO
Subject: Status of Releases from Jamestown/Pipestem Reservoirs - 10 April 2011 (UNCLASSIFIED)
```

Classification: UNCLASSIFIED

Caveats: NONE

Jamestown and Pipestem Reservoir inflows remain high near 900 and 4000 cfs respectively. The James River at Grace City has come up a lot in the last 24 hours, so I would expect Jamestown inflows to only increase. Both reservoirs are tracking with the forecast pretty closely. Jamestown has below 5% of the flood pool occupied and Pipestem has just over 20% of the flood pool occupied.

Downstream gages have remained high. Below is the status of the gages:

Ypsilanti has come down about 0.2 feet from yesterday's high this may be the peak.

Beaver Creek near Montpelier has dropped more than 1 foot from its peak on April 3 and 7.

Adrian has dropped about 0.1 feet from its peak where it was holding steady for the last 2 days.

Grand Rapids has come up about 0.1 feet in the last 24 hours. LaMoure is forecasted to peak at 15 feet on April 12

There are still storms in the area, but so far the upper James River basin has missed most of heavy precipitation.

With the uncertainty of the downstream peak we will hold off release increases till at least tomorrow afternoon. We will evaluate the downstream conditions and update everyone in the morning.

Observations around Jamestown indicate that a lot of the snow has melted, but there is still a lot of water working its way through the system. Some of the smaller creeks have begun to drop, but most of the larger creeks and rivers are near their current highest stage.

Let me know if you have any questions.

US Army Corps of Engineers Water Control and Water Quality Section

Hydraulic Engineer @usace.army.mil

----Original Message----Sent: Saturday, April 09, 2011 2:30 PM To: Temeyer, Timothy E NWO; 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com'; 'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'jfuchs@daktel.com'; 'dave_azure@fws.gov'; 'William_Schultze@fws.gov'; 'Kim_Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke (darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov'; 'mmarohl@gp.usbr.gov'; 'Harris Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us'; 'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil'; 'tim.schaal@state.sd.us' NWO; 🖫 NWO; NWO; Cc: NWO; NWO; NWO; NWO; NWO: NWO; NWO; NWO; NWO; NWO; Ruch, Robert J COL NWO; Schenk, Kathryn M NWO; 🗭 NWO; 🚛 HQ02@NWO; NWO

Subject: Status of Releases from Jamestown/Pipestem Reservoirs - 9 April 2011 (UNCLASSIFIED)

Classification: UNCLASSIFIED

Caveats: NONE

Following is 9 April 2011 update on status of releases from Jamestown/Pipestem Reservoirs.

Overall goal remains to start increasing releases at a rate of 100 to 200 cfs per day as soon as downstream stages have peaked and city of Jamestown is ready. Currently downstream stages remain steady at or near peak stages. City of Jamestown is ready for releases from Pipestem, but would like no more than 100 cfs from Jamestown Reservoir through Monday. The day 1 QPF from 19:00 tonight to 19:00 Sunday is showing up to 1.4 inches of precipitation. Because of the precipitation and high downstream stages, our plan for now is no release increases until at least Monday. We will re-evaluate conditions tomorrow, and send out an updated email.

As described in previous emails, once downstream stages have peaked we will initially ramp up to a combined release of 1200 cfs (900 cfs Jamestown, 300 cfs Pipestem). By the time we get to 1200 cfs combined release we will have updated forecasts and will make decisions on additional increases. Based upon current forecasts of reservoir inflows, it is expected that combined releases from the reservoirs will not exceed 1800 cfs. However our plan is to go above 1200 cfs combined release only as much as necessary. If actual reservoir inflows are less than forecasted, possibly we can hold combined releases at 1200 cfs or in the 1500-1600 cfs range. If we need to go to 1800 cfs combined, we still expect a 1200 cfs Jamestown, 600 cfs Pipestem release is workable unless we get an unusually high amount of runoff into Jamestown Reservoir. Downstream gage status is as follows:

Ypsilanti - has been rising to a new peak and holding steady for the last few hours. Adrian - possible peak today, but holding steady.

Grand Rapids - possible peak on April 5, but beginning it has been rising slightly over the last 24 hours.

Lamoure - National Weather Service forecast of a peak on April 11.

We had aerial photography of James River taken on April 7. Downstream of Jamestown it appears that channel is relatively free of ice cover. Photography is available in ftp site as follows:

Within this folder there are 4 folders:

James_River_Above_Jamestown Jamestown_to_LaMoure James_River_Below_LaMoure Waubay_to_Watertown

Call me or questions.

Thanks,

US Army Corps of Engineers
Water Control and Water Quality Section
Hydraulic Engineer

(Quality Section

(Quality Section

(Quality Section

```
----Original Message----
From:
Sent: Friday, April 08, 2011 5:20 PM
To: 'Krogstad, Duane E'; 'klake@usbr.gov'; 'jbergqui@nd.gov'; 'rschwartzkopf@daktel.com';
'allen.schlag@noaa.gov'; 'Steven M Robinson'; 'jfuchs@daktel.com'; 'dave_azure@fws.gov';
'William_Schultze@fws.gov'; 'Kim_Hanson@fws.gov'; 'Amy Anton - ND Dept. of Emergency
Services'; 'mihall@nd.gov'; 'michial.johnson@co.lamoure.nd.us'; 'mayorkatie@nd.gov'; 'Patrick
Erger'; 'Aycock, Gordon L'; 'Kevin Low'; 'Tom Gurss'; 'Darrell Raschke
(darrellraschke@midconetwork.com)'; 'kristi.turman@state.sd.us'; 'crussell@nd.gov';
'mmarohl@gp.usbr.gov'; 'Harris Hoistad@fws.gov'; 'gvaneeckhout@state.nd.us';
'dfarrell@nd.gov'; 'kimberly.robbins@co.lamoure.nd.us'; 'steve.mcmiller@navy.mil';
'tim.schaal@state.sd.us'
         NWO;
                                     NWO; T
                                                             NWO;
NWO;
                    ■ NWO;
                                         NWO;
                                                              NWO;
                                                                                   NWO:
               NWO:
                                     NWO:
                                                             NWO;
             NWO;
                                                    NWO; Ruch, Robert J COL NWO;
                                   NWO;
Schenk, Kathryn M NWO;
                                  HQ02@NWO;
Subject: RE: Status of Releases from Jamestown/Pipestem Reservoirs - 8 April 2011
```

Following is 8 April 2011 update on status of releases from Jamestown/Pipestem Reservoirs.

Overall goal remains to start increasing releases at a rate of 100 to 200 cfs per day as soon as downstream stages have peaked and city of Jamestown is ready. Downstream stages remain steady. City of Jamestown is ready for releases from Pipestem, but would like no more than 100 cfs from Jamestown Reservoir through Monday. Also we have potential for rainfall over the weekend. Our plan for now is no release increases until at least Sunday. We will reevaluate conditions tomorrow, and send out an updated email.

As described yesterday, once downstream stages have peaked would like to initially ramp up to a combined release of 1200 cfs (900 cfs Jamestown, 300 cfs Pipestem). By the time we get to 1200 cfs combined release we will have updated forecasts and will make decisions on additional increases. Based upon current forecasts of reservoir inflows, it is expected that combined releases from the reservoirs will not exceed 1800 cfs. However our plan is to go above 1200 cfs combined release only as much as necessary. If actual reservoir inflows

are less than forecasted, possibly we can hold combined releases at 1200 cfs or in the 1500-1600 cfs range. If we need to go to 1800 cfs combined, we still expect a 1200 cfs Jamestown, 600 cfs Pipestem release is workable unless we get an unusually high amount of runoff into Jamestown Reservoir. Downstream gage status is as follows:

Ypsilanti - possible peak on April 6, but holding steady. Adrian - possible peak on April 8, but holding steady. Grand Rapids - possible peak on April 5, but beginning to rise. Lamoure - National Weather Service forecast of a peak on April 10-11.

We had aerial photography of James River taken on April 8. Downstream of Jamestown it appears that channel is relatively free of ice cover. Photography is available in ftp site as follows:

ftp://ftp.usace.army.mil/pub/nwo/Aerial_Photos_7Apr2011/

Within this folder there are 4 folders:

James_River_Above_Jamestown Jamestown_to_LaMoure James_River_Below_LaMoure Waubay_to_Watertown

Call me or if you have any questions.

Thanks,

Chief, Water Control & Water Quality Section (office) (cell)

----Original Message---From: NWO

Sent: Thursday, April 07, 2011 6:06 PM

To: NWO; NWO; NWO; NWO;

'rschwartzkopf@daktel.com'; 'jbergqui@nd.gov'; 'Krogstad, Duane E'; 'Patrick Erger'; 'Aycock, Gordon L'; 'klake@usbr.gov'; Martin, Robert J NWO; 'jfuchs@daktel.com'

Cc: NWO; NWO; NWO; NWO; NWO; NWO;

NWO; NWO; NWO; NWO; NWO; Farmer, Monique L NWO; Oldham, Margaret NWO; NWO; NWO; NWO; NWO

Subject: Status of Releases from Jamestown/Pipestem Reservoirs

Following is status of releases from Jamestown/Pipestem Reservoirs.

We would like to start increasing releases at a rate of 100 to 200 cfs per day as soon as downstream stages have peaked and city of Jamestown is ready. We would like to initially ramp up to a combined release of 1200 cfs (900 cfs Jamestown, 300 cfs Pipestem). By the time we get to 1200 cfs combined release we will have updated forecasts and will make decisions on additional increases. Based upon current forecasts of reservoir inflows, it is expected that combined releases from the reservoirs will not exceed 1800 cfs. However our plan is to ramp up from 1200 cfs combined release level only as much as necessary. If actual reservoir inflows are less than forecasted, possibly we can hold combined releases at 1200 cfs or in the 1500-1600 cfs range. If we need to go to 1800 cfs combined, we still expect a 1200 cfs Jamestown, 600 cfs Pipestem release is workable unless we get an unusually high amount of runoff into Jamestown Reservoir. Downstream gage status is as follows:

Ypsilanti - possible peak on April 6. Adrian - still rising. Grand Rapids - possible peak on April 5. Lamoure - National Weather Service forecast of a peak on April 9-10.

Based on conference call with Reed yesterday, we may be able to begin releases on Saturday. We will speak with Reed Schwartzkopf on Friday to get status of city preparations.

Attached is press release that went out today.

Call me if you have any questions.

Thanks,

Chief, Water Control & Water Quality Section (office) (cell)

Classification: UNCLASSIFIED

Caveats: NONE

Classification: UNCLASSIFIED

Jamestowr	n/Pipest	em Rese	ervoirs - Rel	ease Chanç	ges for 2011	1		
			Jamestown Reservoir		Pipestem Reservoir			
			Release	Total	Release	Total	Combined	
			Change	Release	Change	Release	Release	
Date	Time	Day	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	
March 21	1200	Mon		13		50		With the rising pool elevation at Pipestem, the main gate setting is reduced to 0.7 ft. to limit releases at Pipestem to less than 100 cfs. Jamestown releases are through a bypass valve that has been open all winter.
								Pipestem wier flow has come up to 100 cfs and was increased to 200 cfs to begin ramping up releases to evacuate flood
April 11	1030	Mon		13	+100	200	213	storage.

A